NEW APPROACHES TO PARTICIPATION IN FISHERIES RESEARCH

A DISCUSSION DOCUMENT COMMISSIONED BY FAO AND SIFAR

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ABBREVIATIONS USED IN THE TEXT

ACFR	Advisory Committee on Fisheries Research
ACP	African, Caribbean and Pacific (abbreviation used in ACP-EU collaboration)
CGIAR	Consultative Group of Intentional Agricultural research
DFID	Department for International Development of the UK Government
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
ICSU	International Council for Science
IDAF	Integrated Development of Artisanal Fisheries In West Africa
IIED	International Institute for Environment and Development
ITK	Indigenous Technical Knowledge
NGO	Non-governmental organisation
NRC	National Research Council, USA
ODA	Overseas Development Administration of the UK Government (now DFID)
PAME	Participatory assessment, monitoring and evaluation
PAR	Participatory action research
PIP	Participatory and integrated policy
PLA	Participatory learning and action
PR	Participatory research
PRA	Participatory rural appraisal
RNRKS	Renewable Natural Resources Knowledge Strategy
RPK	Rural people's knowledge
RRA	Rapid rural appraisal
SIFAR	Support Unit for Fisheries and Aquatic Research
SIFFS	South Indian Federation of Fishermen Societies
SIFR	Study of International Fisheries Research (Joint donor study)
SLAs	Sustainable Livelihood Approaches
TEK	Traditional ecological knowledge
UNDP	United nations Development Programme
UNESCO	United Nations Education, Scientific and Cultural Organisation

Executive Summary

Approaches to Participation

Participation has evolved from disparate roots in areas such as democracy theory, political empowerment, colonial development and planning. More recently, it has become an important component of development work. The use of participation is considered by many development practitioners to have provided a new paradigm in research and development, one that is completely different from the more conventional top-down approaches. This so-called paradigm shift does not only change the way in which the issue of development is viewed, but also the way it is addressed.

However, the subject of participation is complex and often misunderstood. There are many ways of defining participation and many ways of participating. All too often the term is used to describe a situation where village people are merely co-opted into an outsider's activities. Participation in its more advanced form is much more concerned with fostering relationships, with ways of thinking, and with structures and processes - all of which can combine to create an integrated approach to the way development is practised. Naturally different interpretations of participation, and the different uses it is put to, have given rise to a diversity of approaches using different methods. As the theoretical framework which holds the diverse practical approaches together becomes more clearly understood, there is a growing convergence of views about participation and an increasingly frequent exchange of methods, experiences and approaches across sectors, countries and parts of the development process.

The Motives for Increasing Participation

The motives for increasing participation stem from three broad roots: (i) ***functional motives*** are those concerned with the efficiency and effectiveness of research and development, and are the main driving force behind the efforts of many governments to improve participation; (ii) ***empowering motives*** are concerned with participation as an end in itself and are closely linked to democratic processes, they are associated much more with the approaches of community-based organisations and the NGO movement; and, (iii) ***philosophical motives*** which have explored the understanding of knowledge and knowledge systems between formal science and indigenous culture, and tried to encourage a greater interaction between them.

Different Ways of Generating Knowledge

A vital part of the development process is the generation and use of new knowledge. Generally, this has been taken to mean knowledge that is produced by formal scientific research. However, much literature now exists on traditional (indigenous) knowledge systems, and their efficacy in tackling the necessities of rural communities. As formal science's knowledge of the capacity of the poor to manage their environment and achieve sustainable livelihoods over centuries increases, there is a growing acceptance of the relevance of their knowledge systems in poverty alleviation and sustainable livelihoods programmes. Empowerment is seen more and more as part of the way to efficient development, and indigenous knowledge systems are becoming a more accepted part of that. This is particularly so as new interpretations increasingly question what we believe to be reality, and point out its subjective nature.

Moving Towards a New Approach to Participation

In spite of this trend, much of the language and categorisation concerning participation in research continues to be restrictive and often implies that agenda setting for research is done by the formal research systems, with the fishers[3] being invited to participate in it. In reality the fishers have their own valid "research" which has provided a large amount of indigenous

[3] The term "fisher" is used here to include all those private sector people (men and women) directly involved in the fisheries sector including harvesting, processing, transportation and sale.

knowledge covering a wide diversity of areas related to their environment and their livelihood strategies over many hundreds or thousands of years.

If new approaches to participation in research are to be explored, it is necessary to move towards a more balanced perspective of involvement in knowledge generation which gives due credit to the past efforts of the fishers in creating their own store of knowledge.

Some attempts have been made to bring formal scientific and indigenous knowledge generating processes together through participatory research, mostly in the agriculture sector and much less in fisheries. Participatory research has been broadly classified into four categories: contractual, consultative, collaborative and collegial, depending on the level of participation of the farmers in the process, with collegial research being equally accommodative of formal and indigenous knowledge systems. There are many other dimensions that can be used to measure the different qualities of participation. These include its transparency, the extent to which it empowers, the stages in the research cycle where it operates and the benefits which different participants derive from it.

Fisheries Research and Participation

Perhaps fisheries (especially small-scale fisheries) is one sector where the usefulness of the indigenous knowledge is far more important to the fishers than have been the outputs of formal research. Indigenous knowledge includes not only knowledge of the ecology and behaviour of fish, oceanography, navigation, fishing methods, and processing and preservation of fish, but also of the social, economic and governance structures and processes that operate at the community level. Also, given that fishers are not concerned with only the sector in which they make their income, they have often accumulated knowledge in other areas such as health, agriculture, forestry etc. Whilst the majority of knowledge used by fishers to carry out their livelihoods is self-generated, there are examples where they do contract, or consult with, formal researchers while trying to solve a felt research need.

Formal scientific research in fisheries also has a long history. It has evolved from a focus on species identification and taxonomy, through ecology, behaviour and biomass estimates, to methods for expansion of harvesting capacity. In more recent years, the emphasis has moved towards supporting more effective fisheries management measures in response to the over-exploitation of many of the world's stocks. A recent but less pronounced move has been towards the social and cultural aspects of the fishery.

Such conventional fisheries research has tended to be based on natural-science methods and is predominantly production-focused. Historically, naturalists have used indigenous knowledge to a very limited extent such as in the collection of species and to learn about animal behaviour. In many cases of fishing boat and net development, the vessels of fishers were used to test the methods. In other situations, fishers have been used as a source of information.

There is a growing number of studies on conventional approaches to fisheries research which question their effectiveness in informing policy in ways which benefit the development process either in terms of achieving national development objectives or assisting the development of artisanal fishing communities. There is a growing realisation that the focus, approaches and methods of fisheries research needs to change, but these conventional ways continue to form the main framework on which research is based in most countries.

However, there are changes at the international level such as that reflected in the UK Government's Department for International Development's (DFID) research programme, which recognises the benefits of demand-led research with a high degree of participation at the design, implementation and validation stages. The driving force behind such collaboration is the recognition that neither formal scientific research nor indigenous knowledge on their own is able to deal with the size and scope of social, economic and environmental problems which are currently facing the sector. In recent years more collaborative approaches to research in fisheries have been adopted and some of these approaches have started to produce

some benefits. This process is, however, at very early stages and needs to go a long way before it can become sustainable.

Towards Greater Participation in the Research Process

A new way forward is required which involves a greater balance and quality of participation at different stages of the research cycle. Potential benefits of such an approach include: (1) a research process which is able to call upon and combine existing knowledge from two parallel knowledge systems relatively quickly and cost effectively; (2) research which can combine localised and practical knowledge and skills of the fishers with the theoretical, systematic and rigorous skills of the professional researcher to make research more relevant and reliable; (3) research results generated which are more appropriate to the needs of the fishers, more closely linked to their aspirations and capacities, and validated by them during the research process; (4) faster uptake and quicker impact of the research results as a result of the joint validation process; and (5) more relevant information passing from research into the policy process thus generating greater appreciation of the value of the research and increasing the possibility of improved research funding.

Whilst these benefits are significant there are also constraints to the wider adoption of greater participation in research in fisheries. Some relate to the characteristics of the sector itself, some are political or administrative. Others are to do with changes in the balance of power and control. There are also limitations of the methods themselves and the need to adapt these to the specifics of the sector. The approaches also raise questions of validity and reliability of the methods which need to be considered along with ethics and the fallibility of the data. Whilst they represent obstacles, none is considered to be insoluble.

If the benefits of greater collaboration are to be achieved then significant moves towards improvement in the balance and quality of participation in the research process must be made not only at the stage of research design and implementation but also in the analysis and interpretation of data, the dissemination of research results and how those results feed into the policy process. This offers the opportunity for the use of a range of participatory approaches within the research and development cycle. To be successful this will require fundamental changes in the awareness and orientation of both formal researchers and fishers to the knowledge systems of each other. It will also require changes in trust, relationships and of the way different knowledge systems are viewed and valued. It will also require changes in the institutional structures and processes within which research operates. It will need to adopt more interdisciplinary and multidisciplinary approaches to research, develop interagency linkages and adopt new ways of combining social and natural research systems. It will also require changes in the way policy and research work together.

Conclusions and Recommendations

In conclusion it is suggested that increased participation by fishers in the research process has a very significant and positive contribution to make to the lives of fishers, to the research process itself, and to achievement of sustainable and equitable policy objectives. However, the process is at an early stage of its development and there is much to be done if it is to be mainstreamed as an effective approach.

It is recommended:

1. **That further examples of participation in fisheries research (including small-scale aquaculture) be brought together and analysed in some detail in order to learn, and disseminate, lessons from them. This might be achieved through an international workshop.**
2. **That a programme of research be initiated to: A) understand in much more detail the indigenous knowledge systems of fishers, this should include not only the extent of that knowledge, but also the methods by which it is generated, validated and communicated; B) understand the interface between traditional and formal**

knowledge systems in fisheries; and C) develop ways of allowing the systems to mesh together.

3. **That the methods which have been developed in other sectors for participatory research are, where possible, adapted to suit the fisheries sector and that they take into account the knowledge generated from recommendation 2. Where such methods are inappropriate new methods specific to the needs of the sector should be developed.**
4. **That the implications of this approach, for the institutional and policy structures and processes (including the costs), be investigated and guidelines be developed for taking the changes forward.**
5. **That, on the basis of the results of recommendations 1, 2, 3 and 4, protocols for a much more participatory approach to the research process, specific to the sector, be developed.**
6. **That, on the basis of the findings of the previous recommendations, the importance of moving to a more participatory approach to research in the sector be acknowledged and promoted at the highest levels and that the Code of Conduct for Responsible Fisheries be complemented by technical guidelines incorporating this approach.**

Part A –Context and Rationale

1 BACKGROUND TO THE PREPARATION OF THE PRESENT PAPER

This study was commissioned by FAO (Food and Agriculture Organisation of the United Nations) and SIFAR (Support Unit for International Fisheries and Aquatic Research) on the recommendation of the Advisory Committee on Fisheries Research (ACFR). It is concerned with ***research*** in the context of ***fisheries development.***

The ACFR acknowledges that the fisheries sector is faced with serious social and environmental problems and that current approaches to research have their limitations. It is recognised that participatory approaches and methods potentially have a greater role to play in fisheries research. This study aims to explore that potential and to suggest how we might move forward.

The first stage of the work involved the preparation of a draft discussion document. Stage two involved the circulation and discussion of the document amongst a Working Group of specialists in the field of participatory research. An internet-based discussion board was used to facilitate open discussion. It was hoped at this stage that a diversity of case study material would be generated from the electronic discussion that could inform the report. For a variety of reasons the case study information generated was limited.

Stage three involved the inclusion of inputs from the Working Group and electronic discussion into a final document that was submitted to, and discussed by, the ACFR in November 1999.

Stage four was the production of this FAO document to encourage wider discussion of the findings so far.

The study is composed of 3 parts and 8 sections. **Part A** places participation in context and explains its use. Section 2 deals with the concept and history of participation in development. It looks at the approaches and methods used and the reasons for interest in participation as a process. Section 3 looks at the role of participation in relation to research and explores both the levels of participation and conceptual framework for its analysis.

Part B reviews the current usage of participation in research. Section 4 reviews formal research in fisheries, its aims and its effectiveness. Section 5 explores indigenous knowledge in fisheries and section 6 looks at more collaborative approaches.

Part C looks at the options available for expanding participation in fisheries research. Section 7 brings together the future possibilities of greater participation in research, discusses the benefits and issues and begins to evolve a more collaborative/collegial approach. In section 8 the conclusions from the study are drawn together and some recommendations are provided.

The main focus of the report is on experiences in developing countries because this is where much of the innovative work in participation in research is being carried out. However, it is acknowledged that there is also much to be learnt from developed world experience.

The authors would like to thank all those people who gave their time and effort to make comments on the first draft of this document, particularly the ACFR members. Thanks also go to Tim Bostock of SIFAR and Jan Johnson of FAO for all their work in facilitating the discussions of the draft and for providing valuable comments themselves.

2 PARTICIPATION : INTRODUCING THE CONCEPTS

In this section of the discussion document the concept of ***participation*** is explored, not just in relation to ***research*** but to research and ***development*** in its widest sense. The terms used in participation are sometimes confusing and an attempt is made to clarify some of the terms. The section encapsulates, in simplified form, the evolution of participatory approaches over recent years and looks at how the approaches differ. Lastly the reasons supporting or promoting greater participation are discussed in terms of their functional, empowering and philosophical value.

2.1 Participation: an evolving concept

2.1.1 Rhetoric or reality?

Participation is a term that has become very widespread within the research and development world in recent years. Its use is so common now that some feel that there is a danger that the term will become devalued (Farrington, 1998). Others feel that the use of the term has become so central to development that there is talk of a paradigm shift in thinking (Chambers, 1995). The increased use of the term reflects, in part, an almost statutory requirement by most funding agencies involved in development-related activities, to refer to it. This creates problems in separating the rhetoric of participation from the reality (Okali, Sumberg and Farrington, 1994).

2.1.2 Defining Participation

Within the research and development context, terms relating to participation are often used interchangeably and as Oakley and Marsden (1984) comment, participation defies definition due to its multiple uses. This has led to considerable confusion about what is, and what is not, participation. Participation itself describes both an act and, as Oakley (1991) says, an umbrella term for a supposedly new style of research and development intervention. It can also be viewed as a desired end point related to the degree of involvement in decision-making achieved, a concept of considerable importance in the current governance debate. Oakley and Marsden (1984) describe a continuum of participation which spreads from collaboration to empowerment. Oakley (1991) elaborated on the description of this continuum for use when considering participation in projects. He identifies stages of participation moving from co-operation by people in activities defined and controlled externally, through greater involvement of the people in the decision-making process, to increased control over resources, and ultimately to much greater level of influence over the direction and control of the whole process and the distribution of benefits from it. In assessing the quality of participatory processes in projects Adnan (1992: p29) identifies 6 critical features as shown in box 1.

Box 1: Criteria for Assessing the Quality of Participatory Processes

1. Transparency	Whether all stages of project activities are publicly visible, including decision-making processes?
2. Access to information	Whether there is adequate and timely access to project information for all?
3. Accountability	Whether the agencies involved in project management and implementation are procedurally and periodically answerable to the people in the impact areas, as well as the citizens of the country in general?
4. Meaningful choice	Whether people can participate in a voluntary manner without being compelled, constrained or otherwise left with no other choice?
5. Comprehensiveness	Whether people have been consulted from the very outset in defining the nature of the problem prior to any project being decided upon, as contrasted to consultation during subsequent stages of the project cycle?
6. Non-Alienation	Whether people have participated in a way that they do not feel distanced and alienated from the project management, the implementation process and the eventual outcomes?

From Adnan, 1992.

2.1.3 The historic context

Despite its recent popularity, participation has a long history. Pateman (1970) relates it back to the political philosophers J. J. Rousseau, J.S. Mill and J. Bentham and their work on democracy. In relation to development, Richards (1985) discusses the involvement of farmers in the development processes of 19th century America and Russia. Richards also notes the pioneering work of some of the colonial administrations in recognising the knowledge base of indigenous communities and actively involving them in the development process. There has also been a diversity of approaches which have involved farmers and other primary producers in research and development (Biggs, 1989, Okali *et al.*, 1994). For instance in agriculture, farming systems research played an important part in gaining greater involvement of farmers in the development process (Morris and Copestake, 1993).

Participation has also been a major force in the political liberation movements of some oppressed elements of communities during this century. The major changes that have occurred in the education thinking in Latin America can be related back to participation by local people in their own development processes as recorded by people such as Ivan Illich (1971), Paulo Freire (1972) and Orlando Fals Borda (1985). The concern for the specific role of women in the research and development process has also contributed to the evolution of wider participation theory (Schrijvers, 1995). The development of participatory action research (PAR) as a self-mobilising mechanism for marginalised communities has a long and involved history (Fals Borda and Rahman, 1991; Foote Whyte, 1991; Rahman,1993; and Greenwood and Levin, 1998). It has been used as a major means for enabling and empowering communities. It has also been used by development planners and problem solvers as a quick, and often effective, method of designing interventions, although the extent of participation has sometimes been limited.

Approaches to increase the effectiveness and speed of top-down development planning prompted the development of approaches such as Rapid Rural Appraisal more commonly referred to as RRA (Khon Kaen University, 1985), rapid rural reconnaissance and rapid assessment procedures (Morris and Copestake, 1993). The evolution of RRA into a more participatory approach occurred in the mid 1980s with several Indian NGOs at the forefront. The associated methods gradually became referred to collectively as Participatory Rural Appraisal (PRA) methods (Mikkelsen, 1995). Some now refer to PRA as Participatory Learning and Action (PLA) which is considered to reflect more accurately the process involved. In addition there are more than 24 other approaches which are variations, adaptations or developments of these (Cornwall *et al.*,1993; Prettey *et al.*, 1995). Other participatory approaches have evolved to facilitate participation in specific parts of the research and development processes (see section 2.2).

In recent years there has been a considerable convergence of ideologies surrounding the different movements concerned with participation. This has resulted in a sharing of ideas, experience and methods. Closely linked to this has been the shift in the development process from the production-focus of the past to more people-centred approaches which are established upon the belief in self-reliance, local initiative, involvement in decision-making and power transfers (Korten and Klauss, 1984). Despite the diversity of approaches, Pretty *et al.*(1995: 56) identify some common features:

- They have a defined methodology and systematic learning process
- Seek multiple perspectives
- Incorporate group learning processes
- Are context specific and flexible
- Concerned with facilitation of self development
- Lead to change

A unifying framework, which offers the opportunity for building on, uniting and complementing a wide range of participatory approaches to development, is the Sustainable Livelihoods Approache (SLA). This, in a variety of forms, has now been mainstreamed by a range of NGO and donor agencies such as Oxfam, Care, UNDP (United nations Development Programme) and DFID (the UK government's Department for International Development).

2.1.4 Participation in Fisheries Development

Participation in fisheries has been explored from several perspectives. Much of this interest has come out of the work on customary marine tenure systems and the recognition of the existence, value and application of traditional ecological knowledge to resource management (see Alexander, 1982; Christy, 1982; Ruddle and Johannes, 1985; Scudder and Connelly, 1985; Cordell, 1989; and Johannes, 1994) The rapid appraisal methods adapted and developed under FAO-implemented projects such as the Bay of Bengal Programme (Townsley, 1993a) were more widely adopted through training programmes in other areas (Townsley 1993b). Participatory approaches have been adapted to the urban environment (Reusen and Johnson, 1994), for port development (Johnson and Camara, 1997), for incorporation into the analysis, monitoring and evaluation of interventions in fishing communities (Maine *et al*, 1996), and to suit the aquaculture sector (Townsley, 1996). Linkages between participation at the micro-level and policy frameworks at the macro-level have been explored through research funded by DFID (Campbell and Townsley, 1996; Campbell 1996; and Campbell and Townsley, 1997). There has also been a widespread use of participation across more general development interventions in fisheries (see IIED, 1997 for example).

In some fisheries development programmes the concept of participation has now been institutionalised. As Satia (1996: 4) says of the FAO/DANIDA project Integrated Development of Artisanal Fisheries In West Africa (IDAF): "Community empowerment lies at the very heart of IDAF's strategy for sustainable development and management of artisanal fisheries…But the legitimacy of the strategy depends on community participation". The Code of Conduct for Responsible Fisheries, which was globally agreed by the international community in 1995, makes repeated reference to the participation of fishers in the planning and policy-making of the sector. The recently started DFID-funded and FAO-implemented, Sustainable Fisheries Livelihoods Project will use participation as a core approach throughout its implementation in 25 countries in West Africa.

Whilst the interest in using participatory approaches to fisheries ***development*** (throughout the text development includes fisheries management) has been significant, the interest in participation in fisheries ***research*** has been much less pronounced. This will be explored in more detail in section 4.

2.2 Approaches and Methods of Participation

There is often confusion between the terms ***approaches or methodologies*** and ***methods*** in participation. As Chambers (1998:123) says: "…methodology (and approach) refers to a ***system*** of principles and methods. ***Methods***, refer to a way of doing something".

Within this document we have used ***approaches*** and ***methods*** to refer to different levels of thinking and action. ***Approaches*** include the systems and processes, the philosophy of why participation is being used, the relationships and the power balance. ***Methods*** are the tools used to make the approach come alive.

Different approaches often reflect different motives for engaging in participatory research or development (see section 2.3). Willingness to allow limited levels of involvement of the community members in research or development often reflects the external agent's acknowledgement of the benefits of being closer to the real-world situation but this is often constrained by his/her desire to retain control of the process. Greater involvement tends to reflect a recognition of the value of people's experience and knowledge which might

contribute to a better understanding of problems and how to solve them. A further level of involvement is more concerned with approaches that aim to place the villagers, rather than technology or resources, at the centre of development. Such approaches have been progressively more concerned with empowerment of people and linking their needs and aspirations to the policy process.

Participation in its more empowering sense is not just a change of tools and mechanisms that development workers use. Such participation involves a change in relationship between the external workers and members of the communities with whom they work. This relationship becomes more equitable, with the external worker being a facilitator rather than teacher or controller. There is also a sharing of knowledge rather than an extraction of knowledge. The research and development processes incorporate greater levels of awareness raising and capacity building of the communities concerned and the processes are more action oriented and empowering. The approaches also involve a change of attitude by the researcher towards the communities concerned, from that of the professional using the knowledge and facilities of the villagers, to one of a partnership in the research and development processes.

Associated with each participatory approach is a set of ***methods*** which that approach would tend to use most frequently and which would be adapted to suit the approach. With the growing convergence of approaches many of the methods are now shared. Different approaches to participation are discussed below in 2.2.1 and different methods are discussed in 2.2.2.

2.2.1 Approaches to participation

The journals and grey literature surrounding participation in both research and development contain a wide diversity of approaches and of methods. These move away from the transfer of technology approaches of the past, towards approaches which focus on the generation of knowledge and innovation of technologies through collaborative approaches. In the agricultural sector these have been referred to as 'farmer first' approaches (Chambers, 1989).

Some examples of key approaches are given below.

Participatory Action Research (PAR)

In PAR the social group is helped to formulate a critical analysis of its own situation: its problems, weaknesses, needs, strengths, and resources. By identifying and consolidating the knowledge and skills which they already possess, poor women and men can use these as tools for their own empowerment. Historically PAR reflected a much more stand-alone approach to participation, building on the capacities of the disempowered to make their own changes.

Rapid Rural Appraisal (RRA)

Whilst RRA is not a participatory approach it did provide the foundation for many of the methods used in participatory approaches. RRA enables outsiders to understand rural conditions quickly. It combines methods from various disciplines to yield relevant data. The key principles in RRA are that it is a progressive and rapid learning process where triangulation (cross-checking data by multiple methods) is often used to quickly validate or refute findings; and it is a multidisciplinary learning process where a range of disciplines, local informants, and knowledge are brought together.

Participatory Rural Appraisal (PRA)

PRA grew out of RRA but the community members are much more actively involved in the generation and analysis of information. PRA is generally a continuing participatory process, unlike RRA which is more a one-off process. PRA supports the direct participation of communities, with rural people themselves becoming the main investigators and analysts. Rural people set the priorities; determine needs; select and train community workers; collect, document, and analyse data; and plan and implement solutions based on their findings.

Actions stemming from this research tend to serve the local community. Outsiders are there to facilitate the process but do not direct it.

Participatory Assessment, Monitoring and Evaluation (PAME)

PAME is an approach which is based on the premise that beneficiaries of interventions monitor and evaluate these interventions *de facto* either by adopting changes or discontinuing them as soon as external inputs are withdrawn. This is people-led and gender is explicitly incorporated as a perspective on development.

Participatory Research (PR)

PR is an approach to research which aims to involve community members in the research process to varying degrees. In many instances the community acts as an agent of the external researcher or may collaborate in some aspects of the research such as data collection or analysis. A more developed view of PR is where the community has control of the research process. There are close links between PR and indigenous knowledge (see section 3).

Participatory and Integrated Policy (PIP)

PIP developed within the fisheries sector from a recognition that different policy objectives can conflict and that taking a sectoral approach to policy formulation and implementation has the inherent flaw of increasing this potential for conflict. It also acknowledged that those whose lives are going to be affected by policy processes should be involved in those processes and be linked to national policy frameworks. PIP aims to involve all key stakeholders in the policy process and to integrate these processes across sector and between administrative levels from the community, through local and national, to the international level.

Linkages between approaches.

There are many approaches to participation, each reflects, *inter alia*, the circumstances of its development, the motives driving it and what part of the development process it aims to address. The growing convergence of these different approaches (as mentioned in 2.1.3 above) is a recognition that each has a complementary role to play in relation to the others. PAME provides a basis for monitoring the effectiveness and impact of PAR and PRA approaches used within communities. PR can provide data, which utilises indigenous knowledge, for the policy processes of PIP. PIP can in turn help to create the structures and processes needed to support the effectiveness of PRA and PAR. The relationship between some of the approaches and the research and development cycles is shown in box 2.

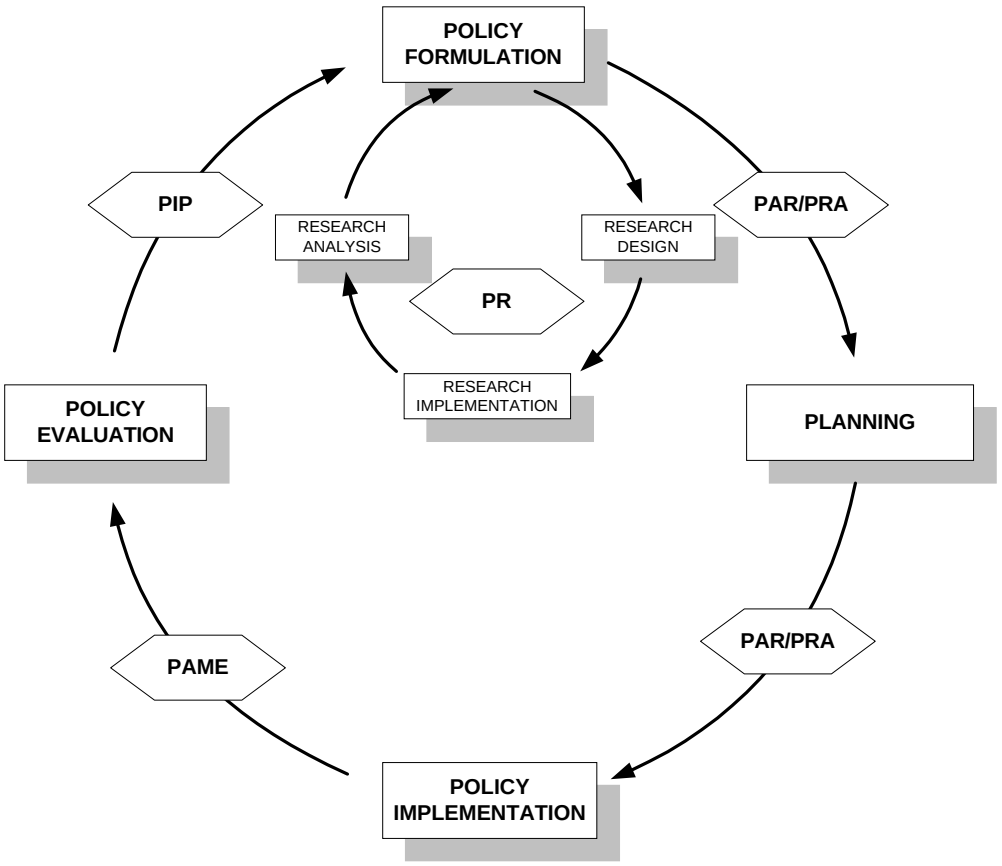
Each approach draws upon approach-specific methods (e.g. qualitative and quantitative research methods in PR) for its implementation. It also draws upon a growing number of participatory methods which can be called upon and adapted to the specific needs of each approach.

2.2.2 Methods used in participatory approaches

Many of the methods associated with participatory approaches were developed under RRA and became more participatory as they were adapted for PRA. Examples of these methods include; mapping and modelling, transect walking, historical transects, community walks, historical profiles, ranking and scoring, well-being ranking, seasonal calendars, time-use profiles, venn diagrams, systems/flow/impact diagrams, pie diagrams, case studies, secondary data review, workshops, direct observations, do-it-yourself, semi-structured interviews, local researchers and village analysts, matrices, traditional management systems and local-resource collections, etc.

A list of some of the methods and their potential application to fisheries is given in Annex A.

Box 2: The Application of Different Approaches to Parts of the Research and Development Cycle



This diagram shows the research and development process as a simplified pair of circles. The research cycle is shown as a smaller circle linked to the development cycle. The different participatory approaches are shown in hexagonal boxes on the part of the development cycle where they are mainly used. Participatory research (PR) applies to all parts of the research cycle. Participatory action research (PAR) and participatory rural appraisal (PRA) operate mainly in the planning and implementation parts of the development cycle. Participatory assessment, monitoring and evaluation (PAME) operates during and after implementation. Participatory and integrated policy (PIP) processes operate at the policy level.

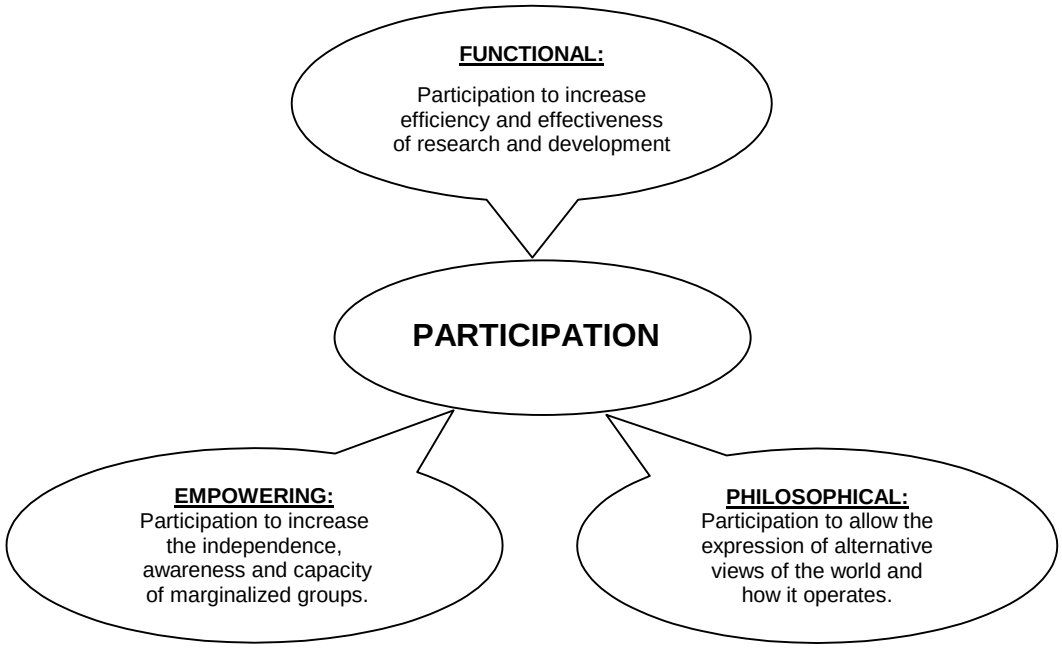
2.3 Reasons for Interest in Participation

The evolution of much of the work on participation in the development process originated from two positions. Firstly, in the international development agencies in the 1970s there was a desire to improve the effectiveness of the development process through greater inclusion of the rural poor in that process (Oakley, 1984). Secondly, in many of the grass roots political movements in Latin America the focus was again on the poor but the emphasis was on a wider form of poverty encompassed by oppression. Both approaches questioned the prevailing development philosophy and sought to increase participation of the excluded to both the process of change and the beneficial products of that change. It has been said that over the last decade there has been a consolidation of this dichotomy into two broad implementation camps: the public sector which generally uses participation to enhance the function of technology design and use, and NGO approaches which aim for empowerment of weaker groups (Farrington, 1998). There is a third, and less obvious, camp which deals more

with the philosophy of science and has been less influential in the practical realities of field research but has contributed significantly to the theoretical debate underpinning the subject.

These reasons can be broadly defined as: functional, empowering, and philosophical. These are outlined below and summarised in box 3.

BOX 3: Reasons for Pursuing Participation



2.3.1 Functional

It has long been recognised that greater participation by those who are to be affected by research or development can improve the efficiency, effectiveness and sustainability of those processes and their outputs. Where such benefits are the reasons for encouraging participation the motive can be broadly described as functional. Chambers (1995) notes several functional reasons for the growing interest in greater participation: (1) that the imposition of standard "top-down" interventions on diverse local realities have failed to address local needs, (2) the greater involvement of local people may have positive cost implications, and (3) the more local people are involved in development initiatives, the more likely they are to shoulder the ongoing cost of maintaining such initiatives.

Richards (1985:12) says, in regard to West African agriculture, that: "Intellectuals, development agencies and governments have all pursued environmental management problems at too high a level of abstraction and generalisation. Many environmental problems are, in fact, localised and specific, and require local, ecologically particular, responses" . He advocates mobilising and building on existing local skills and experiences as one response to this. This response has been echoed in fisheries where traditional management regimes, based on a strong foundation of indigenous ecological knowledge, have been seen as a valuable basis on which to build management partnerships between government and the community.

In addition participation is seen as an important mechanism for gaining compliance with laws and policies. It may be said that whilst the threat of punishment may act as a deterrent to some, for compliance by the majority of people the law must be built upon a basis of morality and self interest (Honoré, 1995). In the fisheries management context: "Fishermen are more likely to comply with management measures when they are able to see the benefits which will

arise from those measures and where they have been involved in the formulation of the measures" (FAO, 1986: 10). From an international agency's perspective it is recognised "that national governments are less likely to ignore international opinion when it is buttressed by popular, grassroots support" (Redclift 1992: 37) and this may be a growing factor in the emphasis on participation in both research and development.

Participation for functional reasons is generally passive and seen as a manageable input to an externally defined process of research or development (Oakley and Marsden, 1984). However, whilst functional participation may have started in this way it has progressively informed and influenced a more fundamental shift towards people-led development, and this includes a parallel shift in research. Chambers says that "Arguably, the big shift of the past two decades has been from a professional paradigm centred on things to one centred on people"(1995:32). In fisheries this shift has been marked by the change in emphasis from research into biological resources and technology, to one which encompasses a greater focus on people as entrepreneurs, consumers, employees, the poor, political participants, men and women and integral parts of wider rural communities.

2.3.2 Empowering

There are reasons for supporting greater participation in research and development which deal with people's right to be involved in activities concerning their lives. These reasons are broadly related to empowerment in that they deal, *inter alia*, with access, power, decision-making, prioritisation, agenda setting and distribution of benefits. Central to empowerment-level reasoning on participation is a reaction against centralisation, bureaucratisation, rigidity and remoteness of the state (Midgley, 1986). In extreme cases it is a reaction to the oppression of one group of people by another and the exclusion of their perceptions of reality from the research and development process (Freire, 1972).

The recent World Conference on Science (ICSU and UNESCO, 1999) said in its post-conference declaration: "What distinguishes the poor (be it people or countries) from the rich is not only that they have fewer assets, but also that they are largely excluded from the creation and the benefits of scientific knowledge". Participation from an empowerment perspective is seen as a process which is both a means and an end in itself. Participation, in both research and development, is then seen as the driving force of the development process and not just a factor for improving the efficiency and effectiveness of "top-down" activities.

In its widest political sense it can be said that "…the recent upsurge in demands for more participation raises a central question of political theory; the place of 'participation' in a modern, viable theory of democracy." (Pateman, 1970:1). There is certainly a growing recognition within the debate on good governance that people have a right to become involved in generating, analysing and using knowledge which will directly affect their lives.

2.3.3 Philosophical

There are also reasons for supporting greater participation in research and development which relate to the philosophy underpinning the way we describe, understand and explain the world we live in. The evolution of participatory processes has led some researchers to the belief that there are multiple realities and that "…professional realities are constructed differently from those of local people." (Chambers, 1998:107). This belief is shared by a small but growing group. The predominant view, however, remains that there is one 'correct' knowledge system and the success or failure of research to generate knowledge is measured in its adherence in approach to that system. Redclift (1992: 34) says: "Sustainable development is usually discussed without reference to epistemological[4] issues. It is assumed that the system of acquiring knowledge in the North, through the application of scientific principles, is a universal epistemology. Anything less than the 'scientific knowledge' hardly deserves our

[4] Epistemology relates to the study and theory of human knowledge.

attention. Such a view, rooted as it is in ignorance of the way we ourselves think, as well as of other cultures' epistemology, is less than fruitful".

This philosophical approach to different knowledge systems influences not only attitudes to participation in the research and development process but also the value placed on indigenous knowledge (see section 5). For policy purposes, science-generated knowledge is generally regarded as more valuable than knowledge generated through indigenous processes (Redclift, 1992). As Chambers and Richards say: "In the dominant model of development, useful knowledge was only generated in central places - in universities, on research stations, in laboratories…" (1999: xiii). This situation is gradually changing and traditional ecological knowledge is playing an important role in fields such as ecology (Berkes, 1993). An important, if rather patronising, step towards greater participation of traditional communities and their knowledge systems has been that indigenous knowledge which has been 'extracted' using social research methods and placed in a scientific framework, has a value-added quality.

3 RESEARCH AND PARTICIPATION

Much of the above discussion has considered participation in the wider development context. This section focuses on participation in research and begins to develop a framework for reviewing participation in fisheries research.

3.1 The Research Process

3.1.1 Research in natural and social sciences

The evolution of our understanding of research is both ongoing and well documented (Hammersley, 1996; Couvalis 1997; McKenzie, 1997; May1997; and Wallerstein, 1998). It is not appropriate to go into the detail of this evolution here but it is important to place research into the context of different knowledge systems.

Research in modern science can be described as the systematic and rigorous collection and analysis of data to describe or explain observations. This process can generate hypotheses or test them, and the quality of the research carried out is measured in terms of its validity and reliability.

In the natural science field, the emphasis of research has tended to be on the use of quantitative methods in controlled circumstances to develop generalised theory with wide application. Whilst there is a strong historic parallel with this in parts of the social science field, the emphasis is much more on localised descriptive research which emphasises the uniqueness of human behaviour in different societies faced with different problems in different physical environments. Social science has promoted and advanced the use of qualitative methods more than has the natural sciences. At least within the sphere of development research there is a progressive convergence of these positions. Researchable constraints are seen less as sectoral issues and more as interdisciplinary and holistic problems involving both the natural and social worlds. As the effectiveness and efficiency of working purely sectorally is questioned (Carney, 1998) and the past production focus of development moves to more of a people focus (Korten and Klauss, 1984), so the need to combine approaches to research becomes a priority.

3.1.2 Research's contribution to development

Formal research within development has a particularly strong link with policy. The purpose of research is very often seen as being to inform policy (situational analysis, problem identification, agenda setting, policy formulation), to improve the efficiency and effectiveness of policy implementation, to allow monitoring and evaluation of policy, and to inform the desired distribution of the benefits of policy. As DFID (1998:131) says: "Research is based on the collection and analysis of data which are processed to create knowledge. The subsequent application of knowledge to effect a desirable outcome is the process of development. Thus

every development paradigm is ultimately dependent upon the creation and application of new knowledge or the application of existing knowledge in new ways".

3.1.3 Research and different knowledge systems

There is a growing recognition of the importance of indigenous knowledge and of indigenous knowledge systems in development (Haverkort and Heimstra, 1999; and Warren *et al.*, 1999) and in fisheries (Ruddle, 1999). The resultant exploration of alternative knowledge systems has raised questions about the modern approach to research. The over-emphasis on systematic and rigorous processes in formal science excludes others from participating in the research process except in ways which are subservient to the professional researcher. Research then becomes 'what researchers do'. Those at the interface between natural and social sciences are challenging this view. If we are to value and use indigenous knowledge then we must accept that the ways in which that knowledge is generated are also of value to the research process. If the processes which generate indigenous knowledge do so in ways which provide reliable and valid data, even if the methods used do not conform to modern science's views of what is 'systematic and rigorous', then they are worthy of further investigation. Indeed, whilst they may not be systematic and rigorous by formal science's knowledge system, they may be so by the knowledge system within which they were generated (see Richards, 1985 and Fujisaka, 1999).

It is at the ***interface*** between these knowledge systems that participation in research is likely to make its most significant advances in the medium-term. This will include assisting to understand the complexity of different knowledge systems and providing ways of meshing the systems together.

3.2 Participation in Research

3.2.1 Levels of participation

Biggs (1989) has suggested four levels of participation in farming research: contract, consultative, collaborative and collegial. These levels represent the extent and type of relationship between the researcher and farmer. This classification, adapted to the fisheries sector, is shown in box 4.

Box 4: Levels of Fishers' Participation in Fisheries Research

Contract:

The outside researcher uses the facilities or resources of the fishers to carry out his or her research e.g. research carried out in village fish ponds or gear trials using traditional craft.

Consultative:

The researcher consults the fishers to identify problems and then find solutions. The fishers play a fairly passive role.

Collaborative:

The researcher and the fishers work together in the design and carrying out of the research, and discuss the implementation continuously.

Collegial:

Researchers actively encourage informal research and development by the fishers where they play a major role in designing the research, defining the methods, implementing the work, and analysing and interpreting the data.

Such approaches tend to imply that participation is a process where members of traditional communities participate to varying degrees in an externally defined research process.

Richards (1985) however, suggests that participatory research might be thought of as a self help concept and that the external scientist becomes a consultant providing guidance when required. It must also be recognised that some research is implemented by traditional communities without any involvement of outsiders. In at least some situations this is done in systematic and rigorous ways (Richards, 1985 and Fujisaka, 1999. See also van Veldhuizen *et al.*, 1997, for a diversity of examples of farmer research in practice). Pretty *et al.* (1995) (see box 5) and Okali and Sundberg (1994) have developed this framework to incorporate self-mobilisation by the community as a further

step. Participation can occur at some or all stages of research (from research prioritisation, design, data collection, analysis, interpretation and action) and to lesser or greater degrees.

Box 5: An Alternative Typology of Participation

1. Passive participation
2. Participation in information giving
3. Participation by consultation
4. Participation for material incentives
5. Functional participation
6. Interactive participation
7. Self-mobilisation

From Pretty *et al.,* 1995.

Participation in the research process clearly has several dimensions such as: 1) the relative balance of participation by insiders and outsiders; 2) the quality of that participation (see box 1 for criteria used by Adnam); 3) the stage in the research-policy cycle where the participation occurs; 4) the degree of empowerment; and 5) the degree of perceived benefit derived by each stakeholder as measured in their own terms. MacAllister (1999:50) discusses monitoring and evaluating the effectiveness of participation in research and identifies a wide range of dimensions that can be used. In conclusion she says: "The many contextual variables which influence participatory research processes make monitoring and evaluating participatory research multi-dimensional and complex. The diversity of natural resource management research projects which apply participatory research methods, as well as the differences in understanding of what "participation" in research implies makes it difficult to compare successes and failures between projects or to generalise about successful participatory research approaches. Furthermore, because the different groups involved in participatory research projects have different indicators and criteria for project success, it is important to understand whose perspectives are needed in order to inform on specific issues or outcomes, and to seek these views in evaluation".

3.2.2 Constraints to participation

A major constraint to the participation process is that surrounding who is included and who is excluded from the participation process (Scoones and Thompson, 1994).

A major concern of the participatory research process over the years is that in the past the community members have often been thought of as a single group with common needs, aspirations and capacities to participate in the research process. This is clearly not the case. Participants consist of many groups of stakeholders differentiated, amongst other things, by gender, age, occupation, wealth, power, access to resources, education, social characteristics and religion. The notion that fishers or any other group of rural people in traditional communities are a homogeneous community working in harmony for the common good is rarely confirmed by experience and such views represent a real barrier to our understanding of participation (Eyben and Ladbury, 1995).

Who actually participates is dependent on a variety of factors including the research objectives, the time involved, the skills required and the interests of the potential partners (Okali, 1994). However, there are additional issues which need to be considered. As Farrington (1998:2) says: "Farmers in the middle and higher income ranges, for instance, may 'participate' …through the market by contracting advisory services…". Wealthier community participants often have farming, aquaculture and fishing processes which mirror those used for experimentation by the research stations and this makes them more attractive to researchers (Chambers *et al.,* 1989).

The situation for the low-income participants is quite different. Not only do they lack the resources to buy into the research process, they often lack the time, infrastructure and the confidence to participate, they may be too vulnerable to risk involvement, or they may be excluded from the process because of their status within the community. In aquatic environments the poor are often located in the most adverse sites where natural disasters such as floods, cyclones, tidal waves are common. These do not lend themselves well to controlled

research conditions. Adnan (1992) gives an account from Bangladesh how poor people in a difficult environment can be marginalized from the very development processes that are designed to help them.

Marginalisation from external research is particularly acute for women in rural areas who face a layer of structural and cultural constraints which restrict and bias their participation (Oakley and Marsden, 1984). It is not enough to add women onto the research agenda as just another participant. FAO, recognising the extent to which gender can affect participation in research has initiated an expert consultation on participatory research methods and gender, particularly in relation to information generation, storage and use (FAO, 1999).

In many fishing communities some of the people are migrants to the area. In some situations they may be seasonal wage labourers who have joined the fishery to complement farm incomes in difficult times. Others may be migrant fishermen and women who follow a particular stock of fish from one location to another, or migrate to make use of varying abundance in different locations. There are important questions to be asked about how these people can and/or should participate in the research process. Another concern for participatory research is that the professional researcher are often specialists in specific fields of knowledge which tend to be divided into sectors and sub-sectors. Community members, on the other hand, tend to be more multi-sectoral in their needs and knowledge.There is a likelihood therefore that they will approach research from different perspectives. Those in control of the research are likely to pick partners with similar research interests.

These points lead to three key problems for the potential participants who are poor. Firstly they are less likely to lead participation in research; secondly the physical conditions of their world are difficult to replicate in a research station; and thirdly they may need support from outside agencies to identify and articulate their priorities for technical change and to help their management of common pool resources to become established (Farrington, 1998).

3.3 Towards a New Framework for Participation in Research

3.3.1 The language of participation

The language of participatory research is emotive and loaded. The term itself implies that one group (the participants) are being invited/allowed/encouraged to participate in the activities, processes or systems of the researchers. The implication being that the researchers are professionals operating in the scientific research framework e.g. in the case of participatory research in fisheries, fishers would tend to participate in the research process of fisheries scientists. In some situations the use of such language is specifically intended to imply different roles for the different participants and may be intended to ensure that the control of the research process remains in the hands of the professional researcher. However, this use of language denies the importance of the role of fishermen and women in their own research and innovation. Their knowledge of the ecology and behaviour of fish (Johannes, 1981), of the weather and oceanographic conditions, of navigation (Worsley, 1997), of fishing methods (von Brandt, 1972), of vessel design and propulsion, of processing methods and trade, has been generated to overcome specific localised problems and to enable them to utilise local resources . Such indigenous technical knowledge (ITK) combines with traditional ecological knowledge (TEK) and fits within a wider social, and cultural framework of knowledge to create what has been referred to as rural people's knowledge or RPK (Scoones and Thompson, 1994).

Traditional knowledge has evolved over hundreds if not thousands of years often in relatively stable social, economic and environmental circumstances. With the rapidly changing social and environmental conditions affecting these communities indigenous knowledge is no longer able to respond quickly enough to the changes and challenges currently facing fisheries globally. As traditional systems begin to break down, traditional knowledge is eroded. There is a growing need for formal science and traditional knowledge to come together to address

these urgent issues. This need for transformation is not restricted to fisheries, but goes right across the renewable natural resources spectrum.

3.3.2 An expanded framework for participation in research

The approach to research which is dominated by the professional researcher is changing and there are many moves towards a greater level of partnership which is more in line with Biggs' collaborative level of participation (see box 4). There is still, however, a tendency to think of participation in research as a process where those in the community participate in the research framework of the outside researcher. Considering the widespread availability of indigenous knowledge and the long history of innovative and investigative practices by traditional communities to generate such knowledge, it is difficult to see why this is so. To avoid perpetuating this formal-science bias to discussions of research it is perhaps more appropriate to talk about *participation in research* rather than *participatory research*. This also acknowledges that participation does not just occur in research itself but can be included in all parts of the research-policy cycle.

Acknowledging the possibility of alternative knowledge systems and of indigenous research without involvement of formal scientific researchers, the remainder of this paper will refer to the participants in the research as though they approached research from two ends of a spectrum. At one end are professional research participants, and at the other are community-based research participants. The professional research participants are those who are employed by governments, projects, NGOs, academic institutions, and consultancy companies to "do research" for a living or as a significant part of a development activity. Community-based participants refers to those people, such as farmers, fishermen, foresters, and processing women, who engage in the research process as an auxiliary part of their normal productive economic activities within the community.

Whilst reference to the innovative and investigative skills of fishers as *research* is likely to generate debate, it is done so here to encourage a broadening of our view of research and open up the opportunities for new approaches.

Using this approach the levels of participation of Biggs (1989) can be expanded to create a framework that incorporates a greater diversity of levels of possible participation in the research process which is less biased towards the professional research participants and their knowledge system (box 6). Nine types of relationships exist in this framework which range from Type A where the professional research participants are implementing research without any form of involvement of the community through to Type I where community-based research participants are generating their own knowledge without any form of outside involvement. Type A tends to be generated by formal research establishments, Type I was in the past concerned with sustainable livelihoods but is now more and more to do with survival.

This framework will be used in the remainder of the report to explore relationships in the research process in fisheries and other sectors. This framework only represents one dimension in the participation continuum and, where possible, consideration is also given in the analysis to the stages in the research cycle where the participation occurs and to some extent the degree of empowerment that is achieved. In the following sections a distinction is made between (a) formal fisheries research, conducted by professional research participants mainly through Type A research in the framework, (b) indigenous knowledge generation conducted by community-based research participants mainly through Type I research, and (c) various forms of collaboration between the two groups. Formal research is discussed in section 4, indigenous knowledge in section 5, and collaborative research in section 6.

BOX 6: A SINGLE DIMENSION FRAMEWORK FOR ANALYSIS OF THE BALANCE OF PARTICIPATION IN FISHERIES RESEARCH

TYPE OF PARTICIPATION IN THE RESEARCH PROCESS								
PROFESSIONAL RESEARCHER-LED					**COMMUNITY-BASED RESEARCHER-LED**			
TYPE: A	**TYPE: B**	**TYPE: C**	**TYPE: D**	**TYPE: E**	**TYPE: F**	**TYPE: G**	**TYPE: H**	**TYPE: I**
Professional exclusive	**Professional-led Contract**	**Professional-led Consultative**	**Professional-led Collaborative**	**Collegial**	**Community-led Collaborative**	**Community-led Consultative**	**Community-led Contract**	**Community exclusive**
CHARACTERISTICS OF EACH TYPE OF PARTICIPATION.								
Only involvement of professional research participants	Professionals 'buy-in' the skills and equipment of the fishers.	Professionals utilise the indigenous knowledge of the fishers for their own purposes.	Professionals allowing the involvement of fishers in the research activities of the professional under prescribed conditions.	Professional and community researchers work equally together to generate knowledge on a constraint of mutual importance.	Fishers Allowing the involvement of outsiders in the research activities of the community under prescribed conditions.	Fishers utilise the knowledge base of the professional researchers for their own purposes.	Fishers 'buy-in' research support from outside to address their needs.	Only involvement of community-based research participants
AN EXAMPLE OF RESOURCE INVESTIGATION WHERE THESE TYPES MIGHT OCCUR IN FISHERIES								
Research carried out in a laboratory, using remote sensing or on a research vessel.	Professionals sample fish using a fisher's canoe hired for gear trials and contracting him to provide labour.	Professionals interview fishers to access their indigenous knowledge concerning the ecology and behaviour of local stocks.	Professional researchers work with fishers to draw up and jointly execute a sampling programme for fish in location and using methods defined by the professionals.	Fishers and professional researchers share a common need to identify new resources, they work together to develop a methodology, implement the research together sharing their knowledge and skills, analyse the data jointly and share in its ultimate dissemination and use.	Fishers request assistance from a research institute to address a particular need they have. They work with the professionals to draw up and execute a sampling programme using methods defined by the fishers.	Fishers consult professional researchers on their knowledge of the ecology and behaviour of the species concerned which has been generated elsewhere.	Fishers request support from a formal research agency to address a specific resource-related issue.	Fishers generate indigenous ecological knowledge of the resources through their own methods of observation and validation.

Part B –Current Responses

4 FORMAL FISHERIES RESEARCH

This section briefly reviews the aims, methods and effectiveness of formal research in fisheries.

4.1 The Aims and Priorities of Formal Fisheries Research

As with other sectors, research in fisheries is closely linked to policy processes as outlined in section 3.1.2. Involvement of the public sector in research in fisheries has been justified in a number of ways: the shared resources and diverse and competing interests; the existence of social objectives which cannot be met by the market; the cost-effectiveness of centralised research institutes; the time and risk elements of return on research investment; and the lack of opportunity for private sector property rights in the results of research (World Bank *et al.*, 1992).

Formal fisheries research has evolved over centuries. Its initial focus was on the identification of different species and their arrangement into systematic taxonomies. Later emphasis was on the ecology of the target species, their biomass and distribution, their behaviour, and the environment in which they lived. This was combined with research into new techniques for expanding production from the waters.

The point to which fisheries research had evolved to in the 1970's is reflected in the guidance to researchers provided at the time: Kesteven's 'Manual of Fisheries Science' (1973) divides fisheries research into biology, technology, economics and operations reflecting the view of the time that fisheries science is concerned with the resource and its harvesting.

As resources became more heavily exploited the emphasis of research shifted to the management of fisheries in order to maximise the sustainable benefits from the resource. The focus of the research has further evolved as the aims of management moved from the maximisation of sustainable production, through sustainable economic benefits, to a balance of social, economic and environmental goals.

The production-focus to scientific research in fisheries gradually expanded and the initial evolution towards economic research has moved towards greater concern for the people involved in fisheries, but the majority of fisheries research remained, until very recently, predominantly focused on the natural sciences part of the sector.

In more recent years "…the complex interplay of community rules of conduct, social sanctions and the interpersonal behaviour of fishermen with formal institutions…" (Ruddle, 1989: 168) in the development and management of fisheries has become more clearly understood and has encouraged the incorporation of more social science into the sector. The SIFR (World Bank *et al.*, 1992) identified the human linkages, socio-economics and policy as applied research requirements. Within FAO's Expert Consultation of Research, held in 1994 to identify priority areas for FAO's involvement in research, one of the challenges for fishery research was identified as improvement of the socio-economic sustainability of the sector (FAO, 1994).

A significant step forward has been the ACP-EU Fisheries Research Initiative which has as its overall goal "to stabilise or increase the socio-economic benefits from aquatic resources, while at the same time reducing environmental degradation" (ACP-EU Fisheries Research Initiative, 1997: 3). Within this initiative there is also a concern for governance issues within research (Nauen, 1995).

DFID's wider development policy calls for a new approach to research (H. M. Government, 1997). Under this approach DFID requires all research to be demand driven and poverty-focussed, and to involve target institutions and primary stakeholders where possible, especially in identifying research needs and priorities (DFID, 1999). DFID's Post-Harvest

Fisheries Programme, for instance, has recently re-focussed its strategy to become much more people-centred and impact-oriented and includes several projects which use participatory approaches (Campbell, 1999).

There has also been considerable research, albeit of a less formal nature, which has taken place within donor-funded projects. Some of this has been much more interdisciplinary and participatory. Methods from RRA, PRA and PAR have been used to generate knowledge during project planning especially where a 'process-approach' is adopted (see ODA 1995, for a discussion of process and blueprint projects).

Some institutions and governments have also recognised the potential of indigenous knowledge to contribute to the research and development process and attempts have been made to incorporate this into research strategies through more participatory approaches to research.

4.2 Modern Scientific Research Methods in Fisheries

The disciplines involved in the scientific research process and the approaches adopted have, of necessity, changed to meet these shifts in emphasis and focus. Much early research was of a descriptive nature and this continues to be important today. Later work aimed to understand the relationship between dependent and independent variables in the physical world which explained ecological and behavioural patterns. This research was characterised by natural science research methods and approaches relying heavily on controlled and objective experimentation. Research methods tended to be quantitative with a strict separation of the researcher from the researched. In may cases they were methods which were developed in temperate climate countries (Gulland, 1979; NRC, 1985) where single species fisheries were predominant and these did not always translate well to the multi-species stocks of the tropics (Munro, 1979). Resource surveys were mainly carried out using large research vessels from international agencies which concentrated on the resources in deeper waters generally outside of the scope of artisanal fishers. The disciplines relied upon were, traditionally, biology, ecology, and to some extent, economics (Clay and McGoodwin, 1995).

In addition to conducting its own research, the fisheries sector has also relied heavily on research conducted in other sectors and the importation of developed technologies into the sector e.g. engines and electronic equipment (World Bank *et al.*, 1992).

As the aims of research have slowly but progressively changed to incorporate a greater emphasis on the social and empowerment issues of the sector, so at least some research approaches have incorporated disciplines such as sociology, anthropology, policy analysis, and institutional analysis. These have brought to natural resources research both different research paradigms and methods. These social science research methods have in some situations complemented natural science research methods. For instance, Richards (1989) describes how ethnographic methods in agriculture have helped to understand some of the fundamental issues of traditional production systems.

In spite of these changes, the top-down, production-focus side of the scientific research paradigm continues to dominate fisheries research in many countries (e.g. see Dehadrai, 1998 for a review of fifty years of fisheries research in India) and the level of integration of fisheries research with other sectors and disciplines has been low (World Bank *et al.*, 1992). It is recognised, however, that this approach is, for many countries, no longer appropriate. SIFR says of India: "There seems to be one theme that runs through all the forgoing discussion of research needs. It is that the most pressing problems facing improved management and development of Indian fisheries appear to be of an institutional, economic and social nature rather than a technical one." (World Bank *et al.*, 1991: 22). This is a theme running through many fisheries research programmes.

4.3 The Effectiveness of Formal Fisheries Research

There can be little doubt that modern scientific research in fisheries has led to increases in our knowledge and continues to do so. However, it is necessary to assess the effectiveness and efficiency of that research given the limited funding available for research effort and the scale of the problems facing the development of fisheries in many countries. Research funding is a small part of overall development funding and it needs to be used effectively if it is to fulfil its vital role.

In the late 1970s it was noted that there was accumulated a large bulk of information in the research literature "…but not much that can be immediately used to help advise the authorities as to whether or not catches can be increased". (Gulland, 1979: 28). In the early 1990s the situation according to SIFR had not moved much further and "most sectoral institutes" were "still heavily engaged in the kinds of programs that were designed when they were established" and "research proposals" were "seldom integrated into coherent strategies for development." (World Bank *et al.*, 1992: 37-38). This study went on to say: "…because present programs are restricted almost entirely to the biological and technical dimensions of existing production systems, or to the introduction of new intensive systems for raising exotic, high-value species, they fail to address the fishery sector's most important issues, which are economic and sociological." (World Bank *et al.*, 1992: 38). Whilst these conclusions are generalised for the developing countries studied, it is noted that the quality of research is very variable between countries and regions.

The limitations of current research approaches are now widely recognised at the highest levels. The Advisory Committee on Fisheries Research in the report of its first session says: "…fisheries scientists and managers recognise the shortcomings of certain current research methods which may, by their nature and origin, be blind to important dimensions of the problems being addressed by research…" (ACFR, 1997: 30). In addition, research funds at the national level are reducing, as Nauen *et al.* (1996: 153) say: "Globally, with a few exceptions, investment in research and in the supporting training system is insufficient in order to maintain or build up a capacity of analysing the state of the resource and of anticipating the measures to be taken to maintain the economic profitability of the sector".

New approaches to research are sought which address these problems. As Charles (1995:233) says: "the pursuit of sustainable fisheries requires a broad vision of fishery science - as the scientific study of fishery systems. This implies the incorporation into fishery science of research on fishery management, fishing processes, fisher behaviour and the human dynamics of fishery systems".

ACFR has identified a need for fisheries research to shift its "…emphasis from a programme of research that, in the past, has been predominantly concerned with fishery resources to a future programme with substantial emphasis on the human dimensions of fisheries." (ACFR, 1997:iv). At a recent SIFAR workshop in Senegal, fisheries researchers and policy-makers for that sub-region of West Africa agreed that the linkages between researchers, fishers and policy-makers were generally weak. It was recognised that in many situations research outputs were not very relevant to the needs of either the policy-makers or the fishers, that the effectiveness needed to be improved, and that participation in research had a very significant role to play.

A much more interdisciplinary and multidisciplinary approach is also called for where sectors are studied together in geographical areas such as the coast (FAO, 1996). There is also a growing recognition of the possibilities which indigenous knowledge (such as in the Code of Conduct for Responsible Fisheries, FAO, 1995), and participatory research offer to the fisheries sector.

5 INDIGENOUS KNOWLEDGE AND KNOWLEDGE SYSTEMS IN FISHERIES

Indigenous knowledge is something which we all have. It has been defined as "…the unique, traditional, local knowledge existing within and developed around the specific conditions of women and men indigenous to a particular geographic area" (Grenier, 1998: 1). A training in formal science attempts to modify that indigenous knowledge and replace it with a more generic form of knowledge which is shared across cultural boundaries.

The extent to which the formal science system is a reflection of the indigenous knowledge system in which it was developed is often ignored but is a growing concern amongst some of those who approach participation in research for philosophical reasons (see section 2.3.3). Formal science certainly operates within a knowledge system and it is at the interface between the indigenous knowledge systems of fishers and that of formal science that many of the problems of transferability, valuation and quality arise.

This section looks at how indigenous knowledge is generated and reviews its the scope, extent and use.

5.1 Generating and Transferring Indigenous Knowledge

Knowledge systems are not all the same (see Mahale and Sorée, 1999, for an account of "cosmovisions" in health and agriculture in India, and Lipset, 1997, for an account of the world vision of fishers in the mangroves of Papua New Guinea). Different people have different ways of generating, compiling, explaining, and storing knowledge. They also have particular ways of communicating the information which they generate from that knowledge (Mundy and Compton, 1999). In many cases empirical knowledge is intertwined with ritualism and spiritual beliefs (Teiwaki, 1988). This combination can provide a useful function in that resource knowledge linked to fear of the spirit world can ensure effective compliance with traditional resource management measures (Lokani, 1995).

The degree to which the methods used to generate indigenous knowledge would be considered by professional research participants as research is an area of considerable debate. The indigenous knowledge of some communities has, as mentioned above, been shown to be generated in systematic ways and clearly has qualities of reliability and validity which the knowledge users consider acceptable. It is likely, however, that much indigenous knowledge is generated as part of the normal livelihood process and accumulated incrementally and over a long time period. Such knowledge may not always be presented in the same cause and effect relationship as that used by professional research participants. However, it may still provide the fishers with a workable explanation of the world they live in. This in turn may enable them to predict likely events with an adequate degree of accuracy to enable them to make decisions concerning their lives. In this regard the question has been posed: "…whose reality are we trying to measure and appreciate?" (Mukherjee, 1997: 28). As fisheries research combines greater elements of social science, and as that science moves away from the rigidity of the single world view of objective reality to one where reality has at least elements of social construction, so then fisheries research must explore new ways of generating, valuing and using data which accommodate these different perspectives.

Few of these knowledge systems are well understood but the value of indigenous knowledge is becoming more appreciated. Traditional ecological knowledge in particular is beginning to play an important role in resource management but it has been slow to develop in fisheries (Berkes, 1993). However, there is a growing recognition of the value of this knowledge and of the importance of recording it in some formal way (Palomares *et al.* 1993). The FAO Code of Conduct for Responsible Fisheries specifically mentions the need to draw on traditional knowledge for both understanding the resources and determining how best to manage them (e.g. see FAO 1997 for the situation in inland fisheries).

5.2 The Scope, Extent and Use of Indigenous Knowledge in Fisheries

Within the fisheries sector, many fishers have a profoundly detailed knowledge of their environment, the species of fish they target, and changes in the waters they fish, navigation, the seasons which influence their fishing and the techniques which preserve fish (see for instance von Brandt, 1972, Johannes, 1981, and Worsley, 1997). This knowledge has evolved over many hundreds or thousands of years.

The knowledge is not restricted to men in fishing communities, women often have detailed knowledge of the various systems, for instance processing and preservation of fish under different circumstances, and of markets. In some communities women play an important role in fishing and have generated knowledge about fish behaviour and harvesting (Tuara, 1995). In some communities the taxonomies of fish species are well developed and the fishing methods adapted to take account of "…differences in anatomy, behaviour and habitats of many different species" (Johannes, 1981: 10). In St Lucia professional research participants found that community-based research participants had developed management strategies for mangroves which enabled harvesting to be achieved on a sustainable basis (Geoghegan and Smith, 1998).

Fishers also have considerable knowledge about the social, cultural and institutional arrangements which operate within their communities, how resources are allocated and how conflicts are avoided or resolved. This information can be useful for designing development interventions or designing effective resource management systems (FAO, 1995).

This is not to say that indigenous knowledge is always accurate, infallible or indeed accurately transferred to the outsider. As Grenier (1998:53) says: “All knowledge systems have their limitations and weakneses, and IK is no exception”. In some cases people's knowledge of the environment may be simplistic and relatively poor (Townsley, 1998). In many cases it is localised, not forward looking, and vulnerable to environmental change (Okali *et al.*,1994). Lightfoot *et al.* (1993) also warn of its limitations. Indeed historic disruptions in the flow of information from one generation to another may severely limit that knowledge to a few individuals in specific communities. In some societies knowledge correlates closely with power and is closely guarded. In Kiribati in the Pacific, for instance, special knowledge concerning navigation or good fishing locations is kept within families (Teiwaki, 1988). Whilst it has its faults, such knowledge is also often free of some of the limitations of modern scientific knowledge generated within sectoral boundaries (Townsley, 1998) and thus may be particularly useful in more integrated systems such as sustainable livelihood approaches and coastal area management.

This indigenous knowledge is often of great significance to the communities concerned and is essential for their livelihoods and the sustainable use of resources (Mulipola *et al.*, 1995; Lokani, 1995; and Saucerman and Kinsolving, 1995). However, the size and scope of the social and environmental problems now facing the sector means that new knowledge is required quickly in order to formulate appropriate responses. Traditional knowledge generating systems and the use of indigenous knowledge in isolation from the outside world is often inadequate to cope with these challenges.

There is growing need to explore the structure and function of indigenous knowledge systems in fisheries, and in particular the interface between indigenous knowledge and scientific knowledge systems. Collaborative approaches to participation in research offer an opportunity to do this.

6 COLLABORATION BETWEEN PROFESSIONAL AND COMMUNITY-BASED RESEARCHERS

This section briefly reviews experiences in participation in research in agriculture before reviewing some examples of experience of participation in research in fisheries.

6.1 The Experience of Participation in Research in Agriculture

The agriculture sector is perhaps the sector in which most progress has been made in involving primary producers and processors in the research process and is the one which is most often cited. It is useful to quickly review developments in this area before moving on to fisheries.

Past conventional research based in agricultural research institutes has been highly effective in generating benefits for wealthier farmers operating in resource-rich areas (Chambers *et al.*, 1989). This is largely because the controlled environments and easy access to inputs of the research institute have usually paralleled those of the resource-rich farmer. In contrast resource-poor farmers operate in more complex, diverse and risk-prone environments (Farrington, 1998). Attempts to transfer skills, knowledge and technology from the research stations to the resource-poor farmers were met with problems which were variously attributed to ignorance or poor farm practices. There is now a growing realisation that the problem is more concerned with the technology and with the priorities and processes which generate it (Chambers *et al.*, 1989).

Most participatory agricultural research, conducted for functional reasons by public sector research agencies, has been done with individual farmers. This has been particularly successful with articulate farmers enjoying good infrastructure in well-endowed areas but less so in difficult areas. By contrast the empowerment-oriented research of the NGO sector has tended to work with groups (Farrington, 1998).

In the past much of the on-farm research has been the validation and demonstration of technologies which have previously been developed elsewhere in controlled condition (Sumberg and Okali, 1989). This represents a contractual level of participation in Biggs' scheme. However, there has been a growing acceptance at all levels of intervention (although not in all agencies in all countries), within research centres, governments, academic institutions and NGOs, of the need to involve local people as active partners in all aspects of research (Scoones and Thompson, 1994). There has been considerable progress in this.

Richards (1985) gives a detailed account of the indigenous knowledge and research capacity of farmers in West Africa and acknowledges a long tradition, both in West Africa and more globally, of participation between researchers and farmers. Bunch (1989) describes examples of technologies which were developed by the farmers themselves and disseminated to their colleagues (such as novel inter-cropping methods, non-toxic pest control, different uses of native grass species for soil conservation and shade).

A workshop held in July 1987 in the Institute of Development Studies in the University of Sussex brought together some 50 people to exchange experiences in participatory research and which gave prominence to the 'farmer first' concept (Chambers, 1989). This stimulated the International Institute for Environment and Development (IIED) to conceive a three-year programme of research support and institutional collaboration called 'Beyond Farmer First: Rural People's Knowledge, Agricultural Research and Extension Practice' . This in turn gave rise to a collection of case studies from a diversity of countries which recounted the experiences in participatory research (Scoones and Thompson, 1994).

The status of participatory research in agriculture was reviewed in 1994 by Okali *et al*. Whilst this cites many examples where participation in agriculture has moved forward, it notes (1994: 135) that "…few projects have developed a satisfactory approach to the interaction of formal and informal research activities".

Further examples of participation in agricultural research are given in van Veldhuizen (1997) who looks at the importance of who initiates and controls the research process, who participates in it and how relationships between farmers and outsiders are established and evolved. In Prain *et al.* (1999) further examples of farmer experimentation are considered and the conclusions reached include:

- Farmers do experiment, although in any society it may only be a few who do
- Farmers know their local situation intimately and their experiments tend to be very site specific
- Any attempt at conservation of natural resources should involve the local inhabitants
- Farmers' experiments are constantly being re-invented – indigenous knowledge is a dynamic topic
- Farmers' experiments are no substitute for conventional on-farm research, but they do provide a valuable resource for the latter
- Women farmers are often also actively involved in experiments

6.2 The Experience of Participation in Research in Fisheries

Some examples of participation in the fisheries research process are given below and discussed more generally in section 6.3.

The collaboration between professional research participants and fishers in research has a long history. Naturalists of the 19th century often understood the level of knowledge of fishers and used them to locate and catch species for taxonomic collections. Anthropologists, such as Malinovski, also worked with fishing communities and recorded the breadth and depth of their knowledge systems (see Young, 1979: von Brandt, 1984; Igarashi, 1984). This work was generally of Type B and C of the framework shown in box 6.

Much of the research into fishing gear and resources carried out by professional research participants up to the 1990s involved fishermen at best as crew to guide researchers to resources. Some were also hired to collect data in the fishing villages where they lived, again a Type B relationship. In recent years it has been recognised that the experience and perceptions of fishermen and women have much to add to those of the researchers. However, this has been achieved in ways that vary in their degrees of interaction between the two groups of participants, at different stages of the research cycle and with different degrees of empowerment. Much of the research into fish disease in fish farming in South East Asia, and the development of fish farming methods for the rural poor in Bangladesh, have tended to be contract-type research (Type B) where local resources, equipment and labour are used to carry out research. Research into the types of mixes of species and the farming practices under different fish farm and rice-fish growing conditions in the North West of Bangladesh has relied more heavily on the knowledge, practical testing and validation by the fish farmers (Type D). In addition the CARE *Interfish* project has focussed on helping fish farmers to develop the skills to understand and work with their ecosystem more effectively (Gregory and Kamp, 1999). This has allowed them to develop research implementation skills through participatory action learning methods that aims to increase their empowerment through a better understanding of their environment. This is an interesting case of Type D participation. The CARE *Cages* project in Bangladesh encouraged women to experiment with different feeding regimes and fish seed stocking practices in fish cage culture. In a very short time the women had begun developing their own experiments and incorporating the findings into their farming practices (Gregory and Kamp, 1999). This not only increased the involvement of the women in the implementation of research, it also empowered them to develop their own trials.

In some, the research relationship has evolved from one where the fishers are contracted to work with the research, to utilising their local knowledge (Type C) or actively collaborating with them to identify and research constraints. In an ODA (Overseas Development Administration of the UK Government) funded research project in the late 1980s, the possibility of taking theoretical laboratory research and applying it practically in the field to improve the use of sail as an aid to fishing was explored. Wind tunnel tests were carried out to determine the performance of different hull/sail combinations under 'realistic' working conditions in a wind tunnel. The theoretical results were then applied to existing sail powered

fishing vessels in Brazil and Tanzania. This research moved from a Type A relationship to a Type D, from research laboratory to working with the fishermen to test the innovations. In spite of improved designs being indicated by the wind tunnel research it was not possible to arrive at designs that, in the minds of the fishers, could improve on what they had. The conclusions of the research were that: "...the design of artisanal vessels and sails is almost inseparable from the set of conditions (such as fishing technique, climate, physical geography, materials available, accepted practice and market opportunities) which governed their evolution. This evolution has often ensured that particular vessels fit almost perfectly into a niche formed by a certain set of conditions, and the resulting craft are as diverse as the environments in which they operate." (Wilson and Davy, 1993). In both locations the traditional sail/craft had evolved using Type I research, i.e. through indigenous research effort over many years providing highly effective craft.

The DFID-funded Post-Harvest Project under the Bay of Bengal Programme initiated research into the experience and problems in the traditional fish smoking practices of Andhra Pradesh, South India with a view to introducing 'Maldive Fish' production into the region. Following initial social, economic and market research the original concept of introducing the processing technology was considered to be unviable. However, during smoking trials to identify the factors affecting the quality of the fish produced, the women fish processors themselves identified the need to research ways of improving their traditional fish smoking practices. The research then changed direction completely to address this demand and a redesigned fish smoking oven was developed and tested in collaboration with the fishers (Salagrama and King, undated). The result was a better fish product, produced more cheaply, under healthier and safer conditions for over 200 families. This started as technology-driven research which evolved to become a very collaborative relationship of Type D with elements of Type G (community-led consultative).

DFID-funded research, implemented in the coastal regions of Ghana, used multidisciplinary research to develop a holistic understanding of coastal ecosystems and to explore the potential for grass-roots participation in environmental resource management and planning. The research started as a Type C research using participatory research methods to consult with the community, and evolved into Type D when a database of indigenous knowledge was jointly designed and created (Porter *et al.*, undated).

Ongoing research in Nigeria, implemented under DFID's Post-Harvest Fisheries Research Programme, is working with fish traders to test participatory fish loss assessment methods. This involved working with traders to determine the effectiveness of using participatory methods to collect statistically valid data on the extent and cause of smoked fish losses during transportation. Fishers have been involved in planning parts of the the research and implementing the data collection. They have also been trained in PRA methods for implementing some of the research in their own communities and some have also been involved in evaluating the effectiveness of the research. Their involvement has substantially raised awareness of the problems and causes of fish loss. This research is mainly of Type D, involved participation in several stages of the research cycle and had the benefit of raising awareness (A. Ward *pers. com.*, 2000).

Ongoing research in India, again under the DFID Post-Harvest Fisheries Research Programme, is working with fish processing women to identify methods for overcoming wet season fish loses. The strategies were jointly developed by the fishers and the professional research participants and then tested by the fishers with support from the professional researchers. The fishers then validated the results of the research within their normal operational social, economic and institutional settings (V. Salagrama *pers. com.*, 1999). This research is a collaborative process of Type D, involving the community in several stages of the research and raising their awareness about possible changes.

In the shark fishery in the southern part of Western Australia research started on a contract basis (Type B) with fishermen supplying catch and effort data for fish stock research. The

research strategy has evolved to a position where fishers are involved in the development of research projects. As a result " the research has the support of the fishing industry and also encourages co-operation and hence the provision of accurate data on catches, fishing effort and tag-captures." (Simpfendorfer and Donohue, 1998: 593). This represents an evolution of the research to a Type D relationship. In a similar way the failure of formal research methods to generate confidence in the fishermen has prompted the Namibian government to collaborate closely with fishermen in the implementation of research with professional researchers and fishermen joining each other on their respective vessels for exchanges of knowledge and experience (Oelofsen, 1998).

The South Indian Federation of Fishermen Societies (SIFFS) is a fishermen's association which has established as a sound base of representation for 6,660 fishermen throughout the South India region (SIFFS, 1998). Recognising the difficulties associated with the supply and cost of ice for its members, SIFFS approached the Natural Resources Institute in the UK (NRI) and asked it to carry out research into the factors affecting the market viability of community owned and operated ice plant within the social and economic context of the South India fishery. This was implemented as part of a wider DFID-funded project under the Post-Harvest Fisheries Research Programme that was researching possible strategies for providing opportunities for value-addition in fish processing for poor fishers (Impetus Management Services, 1997). The research identified ways in which SIFFS could successfully operate as an ice supplier. This research was commissioned by the fishers, albeit through their association, and represents a Type H form of research. SIFFS has also commissioned studies from other technical expertise in the area of vessel design and construction, and it also now hires research staff under its Research and Development Programme. This represents community-led collaborative research (Type F).

The examples of research given above suggest a diversity of degrees of balance between the relative involvement of formal researchers and community-based researchers. There would appear to be a progressive movement towards greater participation during the life of those projects that have involved some elements of participation at an early stage. The examples also indicates that collaboration is rarely occurring in all stages of the research cycle, it is mainly limited to the implementation of research with some involvement in design and some in interpretation of results. In the examples the role of participation in research as a method of empowerment seems to be limited to those projects that are initiated by the fishers themselves although awareness raising has begun to be a more important element of some externally driven research activities.

6.3 Underlying Motives for Increased Participation in Fisheries Research

Increased participation is now being formalised in some research strategies. Within DFID there has been concern for some time that its research should be not only demand driven but should also, where possible, actively involve the poor in the selection, implementation and validation of research. Whilst some of such research remains at a consultative level, a growing amount is collaborative. DFID's emphasis on the involvement of the poor in the research process, particularly in research agenda setting, stems from a realisation that the active involvement of the poor in the research is more likely to result in workable solutions which are relevant to the needs of the poor and within their capacity to use. For example DFID-funded research into the policy process in fisheries has indicated that where the needs, aspirations and capacities of the poor are combined with an understanding of both the livelihood strategies and with approaches which address the multi-sectoral context of their livelihoods, then policies are more likely to be both valid and acceptable (Campbell and Townsley, 1996).

In the main, the motives of donor agencies, governments and research institutions for collaborating with fishers in the research processes tend to be functional (see section 2.3.1). Participation by fishers in research is seen as improving the effectiveness and/or efficiency on the work of the professional research participants. The movement into more participatory

research relationships (especially Type B and C) has been particularly developed in the area of aquaculture where the environment can be easily controlled and the farm environment is more closely matched to the research institute environment.

Some researchers have also been motivated by the lack of effectiveness of more formal scientific research approaches to address the complexity of social world/natural world interactions. For example, when considering the appraisal of natural resources Mukherjee (1997:27) has expressed reservations on the formal scientific methods used: "Despite 'our' sophisticated techniques of valuation, 'our' professional approach faces severe limitations in appraising socio-cultural and ecological dimensions of development projects which are basically context-specific. 'Our' experience shows that neglect or understating of such local dimensions in the past have led to high social and ecological costs and serious problems of rehabilitation and compensation. Given the multiple dimensions and complexities involved, appraisal by technical experts most often tend to become reductionist, sophisticated, generalised and devoid of crucial elements which constitute local level 'reality'". Certainly in many situations, attempts to develop effective fisheries management systems based solely on externally generated information, have failed. There is now a growing response to combine more formal knowledge of the biology of the resource with indigenous knowledge of the ecology and socio-cultural aspects of the community.

The motives of the fishers to take more collaborative approaches to research are, at least in part, in response to the speed of change of their circumstances and size of the problems facing them. There is a desire to engage support for overcoming these problems in ways which are quicker than their traditional research methods.

Greater participation in more general development activities has also been helped by a broad movement of awareness raising, confidence building and skill development amongst rural people. There has been a greater involvement of the local people in transferring attitudes, skills and knowledge across and between communities. The success of participation has also been helped by the growth within communities of a sense of group visualisation of problems and possibilities, brought about by the specific methods used, which has promoted greater levels of co-operation in some communities. Furthermore, there has been a conscious shift in the behaviour of those involved in facilitating the participation process to that of equals and partners with the local people within the development process rather than controlling that process (Chambers, 1995).

In some situations there has also been the motivation of empowerment where fishers see collaboration as the route out of the spiral of poverty which sometimes affects them, or where collaboration with external researchers, to provide improved resource management, may lead to a more equitable distribution of benefits. An important consideration here is the extent to which different groups of fishers with different motives are allowed or supported to become involved (see 3.2.2).

Part C –Options for the Future

7 INTEGRATION OF FORMAL AND TRADITIONAL SYSTEMS

The failure of both formal research and indigenous knowledge systems to fully address the problems facing the sector necessitates a search for alternatives. The evolution of more collaborative approaches to formal research over recent years implies that they offer benefits over non-participatory formal research, and also that the methods used by the formal and participatory approaches are not incompatible.

Whilst the rhetoric of participation may be more developed than the reality, this "rhetoric opens doors, makes spaces, and provides points of leverage" (Chambers, 1998: 111). Approaches and methods for allowing and enabling more balanced participation in research have evolved in a variety of sectors providing a valuable springboard which the fisheries and aquatic resources sector can profitably use. In addition the emphasis on participation in the policies and approaches in many of the donor agencies means that the resources to achieve greater participation in research are, at least theoretically, available. The potential then is considerable. As Chambers (1998:113) says: "Potentials are not just for local level participation, but for changes at three levels: policy, institutional and personal". This potential must be converted into some practical reality of "how to do it" and it must balance the issues, which participation in research creates, with the benefits.

7.1 The Potential Benefits of More Balanced Participation

The moves to encourage and support a greater involvement of fishers in the professional research participants' research activities (Type C and D) have had positive benefits for both groups of participants. The shift in emphasis in development towards people-centred approaches means that the knowledge and perceptions of those people must, at the very least, be considered in that process. Participation by fishers can also reduce the cost of collecting the data and may increase its accuracy. Where future action resulting from the research will include those people or influence their lives then such research will be much more effective if it takes into account the social, cultural and technical knowledge system which structures their lives. Opportunities for fishers to validate the research results will reduce the likelihood of inappropriate research results entering the policy process and generating poor development results at a later stage. It could also lead to more acceptable uses of the research findings in terms of the institutional, management and legislative changes which policy-makers adopt as a result of the research. Without such validity, acceptance and compliance can become critical issues. In fact there are many complaints of the under-utilisation of potentially useful research (Lammerink and Wolffers, 1994).

Empowerment of fishers through this type of collaboration can occur but the research remains outside of their control and, because empowerment is not the motive, it occurs rather slowly.

Research where fishers encourage and support the involvement of professional research participants in their research agenda (Type F and G) also has similar potential functional benefits and possibly more empowerment benefits.

A more balanced relationship is one which starts from a collegial position (Type E) with the two groups working in a partnership of greater equality. From the perspective of this more balanced approach to participation in research, the functional benefits are that it is likely under many circumstances to also increase the efficiency and effectiveness of research. The efficiency, from governments' perspectives, may be increased by collaborative and collegial relationships which tap into the vast store of indigenous knowledge and accessing this relatively quickly and cheaply. From the fishers' perspective, a more balanced relationship may lead to access to more reliable and faster methods of research, and a wider perspective of problems and possible solutions.

In terms of effectiveness it is likely that research results generated through a more balanced relationship will be more valid in terms of the local socio-economic and institutional situation. Policies and their implementation resulting from such research are thus likely to be more specific to, and more acceptable to, the communities concerned. This in turn is likely to lead to faster and wider uptake and impact. This is particularly important for marginalised groups such as women and the poor who may not have the capacity to respond quickly to opportunities created through conventional research processes and thus loose out to more advantaged stakeholders. This will be particularly important in areas such as resource management where the distribution of benefits of management measures needs to be considered.

The combination of formal scientific research with community-based research approaches may provide additional benefits: the reliability of more formal scientific methods may complement, and be complemented by, the greater socio-cultural validity of participatory research methods. This in turn should produce results which are more acceptable to policy-makers and are more workable in the social and economic contexts of the communities concerned. Scientific research and fishers knowledge system working side by side on similar problems can also feed into each other and learn from each other.

Collegial research is also likely to raise the level of awareness of fishers and to provide them with the knowledge, structures and processes which may allow them to take more control over their lives. It may also empower professional research participants by making their research results more effective in informing policy and thus make research funding seem a more appropriate way to spend scarce government money.

7.2 Issues to be Considered

The incorporation of greater participation into fisheries research is not without its problems. Some of these are outlined below.

7.2.1 The Characteristics of the Sector

Much of the participatory research that has been carried out to date has been in the agriculture sector on farms where the resource is static, visible, owned and largely controllable. Capture fisheries, however, deal with mobile resources, which are generally invisible, often from a common pool and largely beyond the control of the researcher. Thus the opportunities to transfer research methods across from agriculture are fewer. As Kurien (1998: 32) says: " Care needs to be taken to ensure that the data and information collection in fisheries is not modelled after the methods and formats used for the agriculture sector". In aquaculture and fish processing the operating environment shares similar qualities with agriculture and the methods are more easily transferred. It is in these areas that participatory experimental research has been most common. This is not to say that participatory research in capture fisheries cannot be advanced. However, it does mean that greater emphasis needs to be placed on evolving and testing suitable methods.

7.2.2 Institutional resistance

As discussed above there are major philosophical divides between different schools of research. These not only concern differences of world views but also of what constitutes research and science. Without changes to these attitudes and a genuine desire to work together and share ideas and experiences, collaboration will not be possible.

If fisheries is to become more people-centred then its research will need to involve a greater focus on social as well as natural science methods. This will inevitably involve more inter-disciplinary and multi-disciplinary approaches which may need to originate from a diversity of institutions. There is likely to be resistance to both a refocusing of methods and a more collaborative interdisciplinary approach. There will also be genuine difficulties of planning and co-ordinating research across sectoral and institutional boundaries. However, there is

already some successful experience of this in fisheries through approaches to coastal area and watershed management.

In some situations this resistance will result in researchers adopting a veneer of participation to satisfy the demands of donors. If these constraints to wider participation in fisheries are to be overcome there is a need to create a more enabling environment in research institutions both in developing and developed countries.

There may be some resistance to participatory research approaches because of perceptions of incompatibility with other development tools such as the logical framework approach and ZOPP. Chambers (1998) refers to these as having a more top-down orientation. However, this is more a reflection of how such methods are currently (in many cases, badly) used. Whilst such methods have structure they need not be any less flexible or empowering than PRA. For example, PRA methods may be used to generate the knowledge which feeds into the logical framework approach.

7.2.3 Cost

The cost of participatory research is a concern that is often given for avoiding greater degrees of participation in research. It is by no means clear that in any situation greater degrees of involvement will increase costs. The costs will depend on a diversity of factors which include the form which greater participation takes, the institutional changes required, the need for investment in skills and the time taken to get results. Against any increase in cost must be balanced the potential increases in benefits that will accrue.

7.2.4 Political resistance

The greater involvement of fishers requires changes in the balance of control. This is not always considered to be in the best interests of those currently in control especially where fishers are considered of low social or political status. This resistance may act within the government administration or at a more political level. Greater involvement is not always easy to achieve as fishers generally work at distance from the point where policies are made. In countries where more authoritarian government systems exist, or where local elites fear change which they do not control, participatory research may be very difficult to implement (Lammerink and Wolffers 1994).

At the political level there may also be resistance to the time scales involved in adopting more participatory approaches. Such approaches are initially likely to take longer times to provide tangible benefits but those benefits will be cumulative as they feed into a more effective policy process. Unfortunately governments work in relatively short time frames which may demand faster results than can be provided.

7.2.5 Empowerment

Knowledge and access to information influence power. To professional researchers knowledge may mean publications and the associated status and he/she may be reluctant to share that knowledge through participatory research. Some researchers may feel that participatory research is less reliable or valid than more traditional approaches and feel that their reputations may suffer from becoming involved in such activities. In addition the research scientist may feel threatened by the increasing involvement of villagers in the research process particularly if the villagers progressively identify research questions which are outside the skills of the scientist or her/his institute.

To the community-based research participants, knowledge may define access to fishing resources or to markets. Sharing this knowledge may affect their livelihoods or social status. In some situations villagers may feel that the results of the research may be used by the authorities for purposes which are to their disadvantage (e.g. to assess taxes or to remove subsidies). In addition the basis of much indigenous knowledge is verbal. The very act of

committing this knowledge to paper can disempower the community-based researcher (T. Sarch *pers. com*. 1999).

Politicians or managers who commission research may also wish to restrict distribution of the knowledge generated for a variety of reasons. Some of these reasons may be in the interests of particular stakeholder groups or in the interest of the sustainable use of the resource. Others may be less positive.

Freire (1972) noted a condition of oppressed people which has often proved a major obstacle to the active involvement of many rural stakeholders in research and development. This he referred to as "self depreciation" reflecting a view of themselves as being useless, ignorant and incapable of meaningfully contributing. To actively and positively engage people in research may require a long process of awareness raising and capacity building. There are also community-level institutional barriers to allowing different stakeholder groups from becoming involved (see section 3.2.2). The poor may be also be excluded from the process by social pressure or because they do not have the time or resources to engage (I. Harkes *pers. com.*, 1999).

7.2.6 Limitations of the Approaches and Methods

Different participatory research approaches and methods have evolved to address different elements of the research and development process. In many sectors the recent focus has been more on development than on research and the methods reflect this. A suite of methods have been developed and many of these have originated or been refined through PRA. These have been largely aimed at the diagnostic activities (Farrington, 1998) concerned mainly with generating ecological and economic information but have been less effective for understanding social relationships (Mosse, 1998). Other social research methods such as participant observation may be more productive for such information. In some situations there may be no participatory substitute for the use of more conventional survey equipment such as complex oceanographic equipment or satellite imagery.

Within a particular sector such as fisheries there will be distinct research processes for which participatory methods have not yet been developed, adapted or tested. Work will need to be done to develop and test such methods.

7.2.7 Research Validity and Reliability

A major criticism of participatory research is that it lacks the objectivity of formal scientific research (Stringer, 1996). However, Rahman (1991:15) counters this by saying "the scientific character or objectivity of knowledge rests on its social verifiability, and this depends on consensus as to the method of verification. There exist different epistemological schools (paradigms) with different respective verification systems, and all scientific knowledge in this sense is relative to the paradigm to which it belongs and, specifically, to the verification system to which it is submitted". This again relates back to the concerns about how objective the world can be seen to be. Arnst furthers this by saying (1996:113) "The largely unquestioned assumption that *scientific* knowledge is more valid or valuable then other knowledge is erroneous. Traditional or *indigenous* knowledge is simply *different* knowledge formulated in response to differing environments, conditions and cultures" (italics in the original). The debate around the philosophical approaches to research continues but participatory approaches are now well accepted within at least some areas of applied social research (see Holland and Blackburn, 1998, for a discussion of this). Certainly the validity and reliability of participatory research has been a significant question in the minds of many researchers (Stringer, 1996; Pretty *et al.*,1995).

An important issue in maintaining the quality of research concerns who should be involved in research. As Lammerink and Wolffers ask: "Are only data that are collected by people who have been trained in a university valuable?" (1994:81).

Clearly the issue is not who or where they are trained but that the quality of the data collection is high and that it is shown to be high. Pretty *et al.* (1995) tackle the question of trustworthiness of research findings using participatory approaches and develop a framework for judging it (see box 7).

In this report the processes that generate indigenous knowledge have been broadly referred to as research to allow the opportunity for their ability to generate valid and reliable data to be assessed. In the framework in box 6, indigenous knowledge is usually generated by Type I participation.

However, one difficulty that has been raised by some supporters of participatory research is that training community-based researchers reduces their individualistic approach to research and makes them more like the professional scientist. As a result some of the benefits of collaboration may be lost.

There is an element of the research community which views fishers in a universally benevolent way considering their knowledge to be almost infallible. This is clearly not the case. As mentioned above, indigenous knowledge is not always the best knowledge. It can often be unreliable, dated, limited, and biased. Such complaints can also be levelled at some scientific research. Research of any type needs to be considered carefully to ensure validity and reliability, and new approaches need to be developed to deal with the interface between indigenous knowledge and scientific knowledge and to address the need to generalise research findings for policy purposes.

Box 7: a framework For Judging Trustworthiness

The extent to which the following criteria were used in the generation of information through participatory methods can be used to establish the trustworthiness of the information.

1. Prolonged and/or intense engagement between the various people
2. Persistent and parallel observation
3. Triangulation by multiple sources
4. Expression and analysis of difference by multiple participants
5. Negative case analysis and hypothesis revision
6. Peer and colleague checking
7. Participant checking
8. Reports with working hypotheses, contextual descriptions and visualisations
9. Parallel investigations and team communications
10. Reflexive journals
11. Inquiry audits to allow validation by outsiders
12. Impact on stakeholders' capacity to know and act

From Pretty *et al.* 1995.

There are many reasons why indigenous knowledge may be inaccurate. Some of these may be because the fishers wish to represent the information so. In others it may be a genuine mistake of interpretation.

There are also concerns that the knowledge systems of fishers and those of professional research participants will be incompatible. That the differences in worldview will be too large to overcome. There is clearly a lot of work to be done in understanding these differences if collegial approaches are to form a major part of future research.

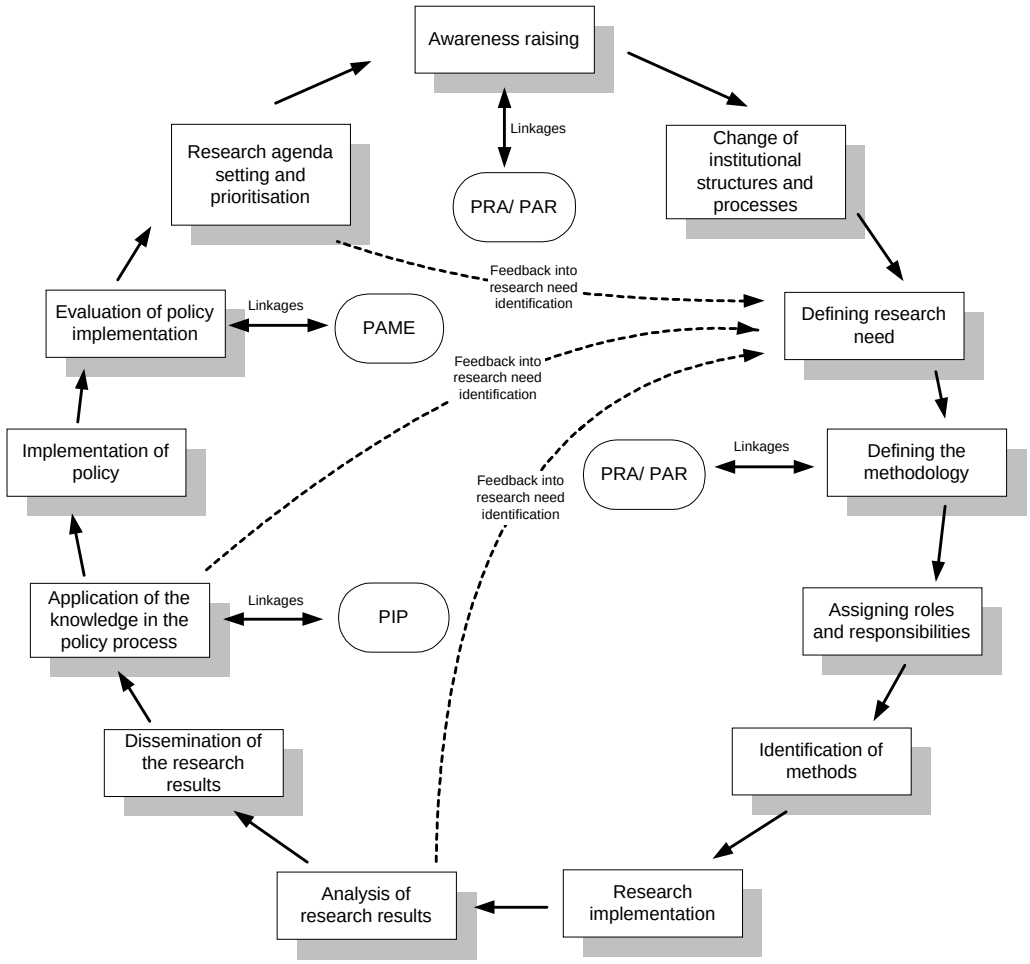
7.2.8 Research ethics

Science is dependent on the honesty of the researchers involved (Kesteven, 1973). A high degree of responsibility is placed on the scientist to ensure that he/she reports his/her findings accurately (Resnik, 1998). This forms part of a wider code of scientific ethic that is largely unwritten (Knael, 1994). Such a code is often difficult for even those formally trained in the scientific method to grasp and incorporate fully into their work. When research moves out of the controlled environment of the research station into the village, concerns may be raised about the degree to which the code is adhered to.

7.3 Towards Greater Participation in the Research Process

If we are to adopt a more balanced approach to participation in research in fisheries, throughout the research cycle, and which empowers as well as improves research efficiency

Box 8: Areas of Collaboration in the Extended Research Cycle



then we *cannot* do so merely by selecting and using a set of participatory research methods from the development tool box. Likewise we cannot merely transfer approaches from other sectors such as agriculture. From the discussion so far it can be seen that participation is not a "quick-fix" solution. More collaborative approaches are, as the name suggests, *approaches*. These involve changes in attitude, structures, processes, skills, knowledge as well as the methods used. These changes need to occur at all levels from international agencies through different levels of government, to research institutes, extension agencies and to the fishers themselves. They also need to occur at all stage of the research cycle as suggested in Box 8.

Although these changes are significant and substantial it is not necessary for them all to occur before better levels of participation can be achieved. Change can occur incrementally and even relatively simple processes such as relaying research findings back to fishers and talking with fishers sympathetically can provide a valuable starting point (R. Johannes *pers.com*. 1999).

What these changes are and how they might be achieved for each stage of the research is discussed below.

7.3.1 Awareness raising

There is a need, amongst all participants, to raise awareness about each other's knowledge systems, knowledge bases, knowledge generating approaches and methods, knowledge validating systems and knowledge communication systems. There is also a need to raise awareness about the potential role of each participant group in each other's knowledge systems and of the potential benefits of collaboration. Within the research process the valuation of different knowledge systems will have to change so that there is greater parity in the way these systems are viewed and treated.

There is a perception amongst some professional research participants that villagers are unable to understand the research process and therefore unable to meaningfully contribute to it. In reality this attitude is more likely to reflect a difference of perceptions between the professional and village participants about what is knowledge and how it is generated. An improved interface between the knowledge systems of the professional research participants and the community-based research participants is crucial to the success of participatory research. This interface should allow the two systems to communicate and for knowledge and understanding to be transferred. Without a mutual respect for, and appreciation of, each others system the partnership is unlikely to be a fruitful one. The professional research participants has a particular role to play in establishing this interface. They are more likely to have a greater capacity to understand such interfaces because of the diversity of social and cultural experiences to which they have been exposed. It is therefore incumbent on them to ensure that an adequate interface is established which caters for the capacities of the community-based research participants and allows an equitable exchange.

There is potential for linkages with other approaches here, such as PRA and PAR, to enable the awareness raising process and to achieve a shift in the power relationships between the different participants.

7.3.2 Change of institutional structures and processes

The scientific research process will need to take a much more interdisciplinary/ multidisciplinary approach to research which addresses the social science issues on a similar level to the technical and natural science ones. It will also need to view its area of research much more holistically reflecting the structure of fishers' lives. There will also be a need for research institutes and agencies to adapt to more collaborative approaches with other institutions to allow interdisciplinary teams to be established and for joint research programmes to be developed. In many research projects, there will be a need for different types of agencies, such as research institutes, government extension staff, NGOs, projects and community-based organisations and associations, to work together. This in turn will require these different organisations to adapt their planning and working conditions to accommodate those of other organisations.

It will also be necessary for researchers to undergo retraining to be able to work with other disciplines, to adopt other approaches and to use new research methods. The ways in which research is assessed and graded for funding and promotion purposes will also need to change to ensure that collaborative, interdisciplinary and interagency work is fully appreciated within the different organisational systems.

7.3.3 Defining the research need

If research is to be more collaborative it must to be driven by the needs of all those involved. To do so it must take into account the needs of the fishers and their capacity to both participate in the research and to respond to the likely outputs of the research. It also needs to involve the diversity of stakeholders in the fishing communities and not treat fishers as a homogeneous group. The research also needs to take into account the wider needs of society as reflected in the demands of policy at the national, local and international levels.

It must also take account of the needs and aspirations of the professional researchers. They too have wishes which have to do with their preferred research areas, their career structures and their social lives. These elements are often forgotten in the process to achieve participation.

The resultant researchable constraint which the research will address should be clearly defined and agreed by all concerned.

7.3.4 Defining the methodology

It has been said that: "It should be obvious that the actual choice of the type, level and intensity of farmer participation in agricultural research is determined, in practice, by many factors" (Okali et.al., 1994: 23). This also applies to the fisheries and aquatic resources sector and to be over-prescriptive would be to constrain what is an area of considerable potential. The approach adopted must be influenced mainly by the desired outcome of the research process itself. It will also be influenced by the capacity and willingness of the community-based research participants to participate. The specific biophysical setting of the research will also be important (Farrington, 1998).

Professional research participants in the natural sciences, and those in the social sciences have traditionally had different approaches to research methodologies. In its most practical form these methodologies often differ in the research methods used: qualitative and quantitative. More fundamentally there are philosophical differences about reality and objectivity. There is a need to resolve these issues and find common ground to move forward. Linkages with other approaches, such as PRA and PAR, will be important for exploring these different systems. Some researchers are advocating an amalgam of approaches not dissimilar to the convergence of participatory approaches discussed in section 2.1.3.

There is also a need for professional researchers to work with community-based researchers to identify an effective interface between formal science methodologies and those used by the fishers. There will be a need to ensure that the data generated complies with the validity and reliability criteria of the systems concerned.

There will be a need to find some common ground on the motives for the research. NGOs may be more concerned with the empowerment aspects of the research, whilst government institutions may be driven by the hope of generating data to contribute to policy in more efficient and effective ways. Fishers may have mixed wishes. They may primarily wish to make enough income to survive, secondly to inform a change of policy for medium-term improvement of their position and thirdly to strengthen their own position within the system.

Issues of the ethics of the research will need to be carefully considered and discussed. Different participants may approach the research from different ethical frameworks and these need to be understood and accommodated in the research process. The confidentiality of data is an important issue. Data provided during the course of the research by one group of fishers or individuals may be permitted to be accessed by outsiders but not by other community members. In some cases information on the location of fish stocks may be treasured secrets, information on wealth may likewise be considered as confidential.

Taking a process approach to research will allow a greater degree of flexibility, relationships to develop, awareness to grow, confidence in each others' abilities to be confirmed, and for later stages, such as assigning roles and identifying methods, to evolve gradually. If participatory research is to involve the poor and vulnerable it must adapt to their specific needs. For example the small-scale experimentation processes proposed by Bunch (1989) for agriculture could be adapted to suit marginalised groups in the fisheries sector. Instead of large-scale trials, which of necessity are high risk, poor fishermen and women should be encouraged to experiment with part of their time, catch, product etc.

7.3.5 Assigning roles and responsibilities

Assigning roles and responsibilities will be a difficult task which will need to take into account skills, attitudes, access to resources, and the priorities of the different participants. It will also need to be done with due consideration of the time frame involved in the research and the time frames of the different participants. Fishers may work at different rates than professional research participants, they may have more free time at different times of the year than the formal researchers and they may like to participate at times of the day when formal researchers may not.

7.3.6 Identification of methods

The methods chosen for the research should be mainly driven by the requirements of the researchable constraint that the research is to address and by the desired research output. It will also be influenced by the skills of the researchers.

There are many participatory methods which allow collaboration of different types (see Annex A). These have mainly been developed in other sectors to allow villagers to participate in professional research programmes in a relationship of Type C and D. In many situations these will need to be adapted to address the kind of situations which confront fishers. There is a need to adapt more formal scientific research methods to allow the participation of fishers in them. In other cases new methods will need to be developed (for example DFID is funding research into more participatory methods for assessing fish loss in the processing chain). Some success has already been achieved in areas of data collection and recall surveys (S. Garcia *pers. com*., 1999).

In many situations both groups of researchers will need to be trained in new research methods which accommodate greater participation. This should be done with due consideration for the fact that most participatory research methods have been developed within the world view of the professional research participants and will not necessarily translate well for use by community-based research participants. Fishers also have methods for collecting data. These will need to be understood by professional research participants and, where appropriate, incorporated into the research methodology.

It is likely that a multiplicity of research methods will be used in order to allow different participants to triangulate the research results thus allowing validity and reliability tests to be applied across knowledge systems. This may increase workloads in the initial research relationships but will reduce as confidence in each other's approaches and methods increases.

7.3.7 Research implementation

The research implementation will require co-ordination to allow the different elements to work well. There will be a need for mechanisms to facilitate that co-ordination without a transfer of power which creates an unbalanced situation. Professional research participants are, as the name suggests professionals whose income and status derives from the research they do. Community-based research participants, however, derive their income and status from other activities which research is a small part of. They may also be much more risk sensitive and risk averse than professional research participants. It will be necessary for the implementation process to accommodate these different perspectives. It is not always desirable (from either the researchers' or the community's perspectives) to maximise the level of collaboration, some situations of research work may demand a low level of participation (I. Harkes, *pers. com.,* 1999) especially where the potential participants have a vested interest in seeing a specific outcome from the research.

7.3.8 Analysis of research results

The analysis of data will be an important collaborative process and one where many of the benefits of collaboration will become most apparent. There are, however, major obstacles to harmonising analysis methods from formal and community-based approaches. Many of the

approaches to data analysis from formal science are very systematic and involve precise mathematical or procedural stages. Community-based approaches are likely to be more intuitive or iterative, taking place over a longer period of time.

Finding a common interface between the approaches to analysing, interpreting and explaining what the research has generated will be a major challenge. It may be necessary for different groups to use different methods of analysis but there should be much dialogue to allow a progressive evolution of some consensus as to what the research has generated and what it means. This process will require a major shift in the attitude which many researchers currently have concerning the ability and knowledge of fishers and may require some adjustment of thinking to accept that other ways of looking at the world exist.

7.3.9 Dissemination of the research results

As mentioned above, the data acquired through collaborative research is likely to make use of data which is confidential and to give rise to descriptions and explanations which may have important policy implications. The needs of all the stakeholders must be considered carefully to assess what information should be made available, to which audience, and in what format. This should also be considered in the light of the changes of behaviour which the research aims to achieve in different audiences.

Collaboration in this process can have real benefits in deciding the structure and format of dissemination media. Literacy levels, attitudes to colour, pictures and symbols all need to be considered carefully within cultural contexts.

7.3.10 Application of the knowledge in the policy process

The collaborative generation of new knowledge by itself is important, but many of the real benefits of this process come when that knowledge enters the policy system. If collaboration stops following the dissemination of research results then these benefits may be lost. At this level collaboration can enable the realities and priorities of poor and marginalised people to be expressed and communicated to policy-makers (Chambers, 1998).

Fishers have an important role to play in the policy process particularly in contributing to the way the new knowledge is valued in the policy process, and is used in formulating policies and the plans for policy implementation.

Participatory research at this stage links into other approaches such as PIP and becomes an important tool in changing the overall policy framework.

7.3.11 Implementation of policy

Likewise the fishers need to be more actively involved in the implementation of policy and in deciding how the new knowledge is transformed into change which will affect their lives. Fishers often have important adaptive and coping strategies to deal with the problems which they face on a day to day basis. It is important that the policy implementation meshes well with these strategies. The development of local level implementation strategies again links the participatory research process to other approaches such as PRA and PAR.

7.3.12 Evaluation of policy implementation

It is important that the collaborative approaches extend into the assessment of the effectiveness and impact of those policies on the people concerned. Linkages with approaches such as PAME will be important for this.

7.3.13 Research agenda setting and prioritisation

The results of collaborative research need to feed into the research agenda setting processes. As Chambers (1995:42) says: "…determination of priorities in …fisheries and other natural resources research should be much more by and through the analysis and experience of local people, weighted to give voice to women, weak and poor people". The priorities of the

different stakeholders need to be considered. There should also be a involvement of the fishers in deciding what the research agenda should be. Without this level of collaboration then community-based research participants would have to participate in someone else's research programme. This is unlikely to lead to a sustainable collaboration.

The issues addressed by participatory research are likely to be very relevant at the local level and, due to the social and economic complexities of communities, to become less relevant as the results move out of their specific context. To maximise the effectiveness of fishers' involvement in research agenda setting it may be particularly appropriate to focus their inputs primarily into local-level research planning processes. At higher levels of agenda setting the involvement of fisher representative groups may be more appropriate.

Attempts to increase participation in decision making have been studied in other sectors and can be considered under three broad categories (Prior *et. al* 1995:138):

- Involvement in the governing bodies themselves
- Involvement in the management of services
- Involvement in policy and service development

These categories need to be explored within the fisheries context to identify appropriate agenda setting and prioritisation mechanisms.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

This brief review of the practice and potential of greater participation of all key stakeholders in fisheries research illustrates some important points:

A. There are different motives for promoting participation: functional, empowering and philosophical. They reflect both the historic evolution to participation and the institutional and professional positions of the different groups involved.

B. Whilst participation approaches and methods are well developed for the implementation of policy at the micro-level, participation in research lags behind and is still mainly viewed as "them" (the community members) being allowed to participate in "our" (the professionals) research.

C. There is a belief amongst many in development that "participation" is a mechanism which can be incorporated into the current paradigm by using a few participatory methods here and there. This is not the case. Participation in research is an approach which requires systemic and attitudinal changes across the research process. These changes need to involve administrations, policy processes, institutional linkages, skills, values and perceptions of different people's knowledge systems. However, there are ways in which the current process can start to become more collaborative without major change. This should start with attitudinal change rather than changes in methods.

D. There is a need for an expanded framework for understanding the different types of relationship in the research process which incorporates indigenous knowledge and the initiatives which fishers have themselves made. This has been started in this paper. Within this framework there is a need to consider the potential for all different stakeholders to become involved. This should specifically address the needs of the poor, the vulnerable and in particular women who make up such an important part of the sector.

E. Formal fisheries research has not always been as successful in generating the kind of knowledge which policy makers and fishers need as it should have been. It is well recognised that this situation must change. In the future there will need to be a greater emphasis on research being demand, rather than supply, driven. This will require research

to more closely match the holistic nature of the lives of fishers and to forge linkages between natural science methods with those of the social sciences in multidisciplinary ways.

F. Indigenous knowledge of fishers is prodigious and its validity, reliability and predictive capacity have allowed fishing communities to use their resources sustainably over many generations. However, the size and scale of the social, economic and environmental problems now facing the sector mean that new knowledge is required to respond quickly. Traditional knowledge-generating systems and the use of indigenous knowledge in isolation from the outside world is often inadequate to cope with these challenges. New approaches are required.

G. Collaborative approaches to research which unite the skills, approaches and knowledge of fishers with those of the professional research participants offer an opportunity to face some of these problems. Some progress has already been made towards this approach in other sectors such as agriculture. However, in fisheries there appears to have been little real experience of participation beyond the consultative levels although this is rapidly changing. In general, professional researchers and community-based researchers know little of each other's methods to generate knowledge, how they validate it and how they communicate it.

H. The potential benefits of increased collaboration are: (1) a research process which is able to call upon and combine existing knowledge from two parallel knowledge systems relatively quickly and cost effectively; (2) research which can combine localised and practical knowledge and skills of the fishers with the theoretical, systematic and rigorous skills of the professional researcher to make research more relevant and reliable; (3) research results generated which are more appropriate to the needs of the fishers, more closely linked to their aspirations and capacities, and validated by them during the research process; (4) faster uptake and quicker impact of the research results as a result of the joint validation process; and (5) more relevant information passing from research into the policy process thus generating greater appreciation of the value of the research and increasing the possibility of improved research funding.

I. There are also obstacles to the wider adoption of participatory research in fisheries, some relate to the characteristics of the sector itself. Some are political or administrative. Others are to do with power and control. There are also limitations of the methods and the need to adapt these to the specifics of the sector. The approaches also raise questions of validity and reliability which need to be considered along with ethics and the fallibility of the data. Whilst they represent an obstacle, none is considered to be insoluble.

J. If the above benefits are to be achieved then greater levels of meaningful collaboration in research need be adopted at all stages of the research process. This must be built upon a process of awareness raising and institutional and procedural reform. It requires greater participation by fishers in the design and implementation of research, in the analysis, interpretation and dissemination of results. It also requires participatory research to be linked into other development processes. In particular it is vital that fishers are involved in the application of the knowledge generated to the policy process and in the implementation of those policies. Furthermore, fishers should be meaningfully and actively involved in the evaluation of the effectiveness of those policies so that they can also feed back into future research agenda setting and research prioritisation.

K. This is not to say that all research should be more collaborative. There is still an important place for research which is not collaborative and which is done by either the professional researcher or the community-based researcher. It is the objectives of the research that need to define the methods and approach adopted.

L. Within this extended research cycle there is a need to forge linkages between participatory research and other participatory approaches such as PAR, PRA, PIP and PAME, and to continuously learn from other sectors.

These conclusions suggest that participatory research in fisheries has a very significant and positive contribution to make to the lives of fishers, to the research process itself, and to achievement of sustainable and equitable policy objectives. However, the process is at an early stage of its development and there is much to be done if it is to be mainstreamed as an effective approach.

8.2 Recommendations

To assist that process the following recommendations are made:

1. **That further examples of participation in fisheries research (including small-scale aquaculture) be brought together and analysed in some detail in order to learn, and disseminate, lessons from them. This might be achieved through an international workshop.**
2. **That a programme of research be initiated to: A) understand in much more detail the indigenous knowledge systems of fishers, this should include not only the extent of that knowledge, but also the methods by which it is generated, validated and communicated; B) understand the interface between traditional and formal knowledge systems in fisheries; and C) develop ways of allowing the systems to mesh together.**
3. **That the methods which have been developed in other sectors for participatory research are, where possible, adapted to suit the fisheries sector and that they take into account the knowledge generated from recommendation 2. Where such methods are inappropriate new methods specific to the needs of the sector should be developed.**
4. **That the implications of this approach, for the institutional and policy structures and processes (including the costs), be investigated and guidelines be developed for taking the changes forward.**
5. **That, on the basis of the results of recommendations 1, 2, 3 and 4, protocols for a much more participatory approach to the research process, specific to the sector, be developed.**
6. **That, on the basis of the findings of the previous recommendations, the importance of moving to a more participatory approach to research in the sector be acknowledged and promoted at the highest levels and that the Code of Conduct for Responsible Fisheries be complemented by technical guidelines incorporating this approach.**

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ANNEX A: PARTICIPATORY METHODS AND THEIR APPLICATION IN FISHERIES RESOURCES RESEARCH

METHOD	DESCRIPTION	APPLICATION OF METHODS FOR RESEARCH IN FISHERIES RESOURCES MANAGEMENT
1. Review of existing data	Participatory methods demand from the researchers some basic understanding and background of the likely issues to be addressed through research. This information could be from two sources: *Documents*: Research and other official and unofficial studies and reports on socio-cultural, political, ecological conditions, national and area-specific statistics, topical and area-specific articles from journals and newspapers, archives and files, aerial and satellite photos and maps. '*Folklore'*: Mythology, oral tradition, local and topical stories, proverbs and poetry. However, the researcher must be careful in the selection and analysis of secondary data as too much emphasis on previous analyses and opinions can be misleading.	In fisheries resources research, a review of both existing literature and of the indigenous knowledge available with the fishers before planning the research components and methodology would provide an understanding of the issues related to trends in resource utilisation, impact of fishing and fish utilisation practices on the resources, fish taxonomy, fish behaviour, ecology, fisheries catch rates, changes in bio-physical conditions.
2. Direct observation	This helps identify different zones within appraisal area, economic activities, key indicators of conditions, new topics or issues for discussion, besides helping in the assessment of differences between reported conditions and real conditions. These observations cannot be assumed to be anything other than a starting point but will give the outsider a useful reference point for explorations during the appraisal exercises	Direct observations help the researchers in understanding the interface between the users, i.e., fishers, and the fishery resources, to assess harvesting and utilisation patterns, and to appraise opportunities for more sustainable resource utilisation, alternate income generation within and outside the fisheries sector, etc.
3. Transect walks and guided field walks	The researcher and key informants conduct a walking tour through areas of interest to observe, to listen, to identify different zones and conditions, and to ask questions to identify problems and possible solutions.	Transect walks and drawing up transects helps the researchers to understand the socio-economic conditions of fishers, access to fishery resources for different stakeholder groups (traditional, motorised, industrial etc.), and possible options for responsible management of fisheries resources. Also they reveal multiple use of the aquatic environment, influence of other sectors in the aquatic environment, such as pollution, siltation, etc.
4. Transects	Transects are cross-sectional maps or diagrams of an area. They are constructed as a joint exercise with local informants during walks through the area for observing, discussing and registering the endowments and problems of the area.	They help in obtaining information on the distribution of fisheries resources and of fishing systems in the area, as perceived by fishers. They also point out areas of joint use with other sectors, and possible areas of conflict with other resource users.
5. Do it yourself	The researcher tries to assimilate into the milieu in which research is to be done, and the target groups are encouraged to teach the researcher how to do various activities 'their way'. The researcher will learn how much skill and strength are required to do day-to-day rural activities, gaining an insider's perspective on a situation.	This gives an understanding of the dynamics of different fishing systems. The researchers get to understand the fishers' perceptions of fisheries management, location of fish resources, behaviour of fish, climatic and environmental conditions and sustainable livelihoods. The researchers obtain an idea of the gaps in information related to indigenous systems of fishing and fishery management.

6. Night halts	The researchers live in the village during the research process. This facilitates all interactions between the outsiders' attitudes, and allows for early morning and evening discussions, when villagers tend to have more leisure time.	Gives an opportunity to the researcher to experience life in a fishing community as it is lived. The post-harvest aspects of landing at different times, and its impact on the fishers could be studied.
7. Informal interviews	The informal interview is perhaps the most widespread method of RRA. It needs careful handling, striking a sensitive balance between open-endedness and directed enquiry. Much information can be generated this way, but care is needed to weed out the useless information, and in validating much of the generated data. Interviewees can be typically key individuals, focus groups or mixed groups. Chains of interviews between the different key individuals, groups and specialists can be a useful sequencing of data collection.	This provides an insight to the researchers into the livelihood strategies of fishers, information on the changes in the fishing resources over time, fishers' perceptions of what causes resource declines and how resources can be more sustainably utilised.
8. Group meetings	Group meetings will be one of the most important tools for community information gathering, and communication of information. They can help communities give and receive information, discuss issues of relevance, gain a consensus on an issue; identify problems and solutions; plan activities and negotiate conflicts, and validate interpretations of evaluation results and formulate recommendations.	They help the research team to establish rapport with the fishers, and lay the ground for problem identification - i.e., declines in resources, and work out a possible research methodology incorporating indigenous knowledge systems. They also cast light on the dynamics of the group which can assist in researching community institutions.
9. User-group (focus groups) interviews	Established groups of fishers, or people using the same resource are interviewed together. This technique can help identify collective problems affecting a particular group of stakeholders and solutions.	They help identify problems associated with access to resources by different stakeholder groups - in traditional, motorised and industrial fisheries etc. - and opportunities to overcome imbalances in accessing resources.
10. Semi-structured interviews	Semi-structured interviews use some predetermined questions and topics but allows new topics to be pursued as the interview develops. The interviews are informal and conversational but carefully controlled. The facilitator not only has to be an effective communicator but also a good listener and quick thinker.	They help in studying the fishers' perceptions of fisheries, changes in the fishing systems and trends in fish catches. They help in deciding how indigenous and 'traditional' research methods can fit into a common framework and mutually support each other in implementing the research. Also this allows quieter/shyer individuals to voice their opinion, which is not possible in groups.
11. Short questionnaires	Short and issue-specific questionnaires can be useful if conducted late in the research process.	As above
12. Key probes	A question addressing a key issue is asked of different informants, and the answers are compared.	This helps in obtaining the responses of different stakeholders - traditional, motorised and industrial fishermen, for instance - to issues like, the effective and equitable use of a common waterbody.
13. Local researchers and village analysts	With some training, local people can conduct the research process. Ad hoc investigations by local residents can be extremely valuable. A person who has links with an area can be not just a key informant but also a key researcher, able to find out very quickly and efficiently what needs to be known, and in validating the data.	Fishers can assist in collection of research samples, providing the fishing craft for research purposes, regular fish landing data collection, and providing/gathering information on socio-economic issues related to their lives, and institutional information on traditional resource management.

14. Portraits, profiles, case studies, and stories	Household histories or stories of local importance are recorded. This can be an efficient way to learn about the local biodiversity, management systems, and taxonomies	The researchers obtain an idea of the evolution of fishing systems over time, and the impact of excessive fishing effort or declining resources on the socio-economic conditions of the fishers. Also provides information on the changes in the biodiversity in the aquatic environment, and possible causes.
15. Folklore, songs, poetry, and dance	Local folklore, songs, dance, and poetry are analysed to provide insight into values, history, practices, and beliefs.	As above. Also, this helps to understand the needs and aspirations of the fishing communities, and to build up rapport between the outside researchers and communities.
16. Intriguing practices and beliefs	Indigenous practices and beliefs are noted, even if they are based on myth and superstition. Even practices that are unusual or don't fit in with conventional scientific thinking are worth exploring because they are meaningful to local people.	These help the researchers to understand how some of the traditional management measures - such as fishing holidays, rotation systems of fishing etc. - came to be effectively implemented.
17. Ethnobiographies	Local histories of a crop, an animal, a tree, a pest, a weed etc,.	The ethnobiographies can help to understand the history of local fish species from the fishers, to relate the biology of different species to the utilisation patterns in the traditional systems, etc.
18. Murals and posters	They provide a useful way to focus, discuss, analyse and present visual objective statements, develop community extension messages, show problems, solutions, activities and/or objectives, present past, present and future images for inspiration.	Murals and posters are a good way to raise awareness related to a number of issues involving community-based fisheries resource management, and the potential for the fishers to take a pro-active role in this regard.
19. Games, role plays, and street theatre	They are optimal methods for bringing sensitive issues into the open. Activating people to play normally requires skilled facilitators, but this has been seen to be a very effective way to bring out different facets of a problem.	These methods make it convenient to gather information on various fisheries, fish capture, processing and disposal systems. They also help to discuss the problems of inequitable distribution and overexploitation of resources, and explore solutions.
20. Participatory diagramming	People are encouraged to display their knowledge on pie and bar charts and flow diagrams. Diagrams can give clearer and more precise information , especially with less articulate individuals. One important feature of diagramming is that it can be conducted with people who are illiterate or semi-literate.	This can be useful in getting the fishers' knowledge and impressions on the distribution of resources, and in identifying how conflicts could evolve between the different resource users, and in exploring conflict avoidance systems.
21. Venn diagrams	Used to depict the participants' sense of relations between local groups and organisations. Overlapping circles are used to represent people, villages, or institutions indicating the degree of interrelationship between the different decision makers in the village; lines are added to reflect inputs and outputs.	Venn diagrams are useful in understanding the usage of the aquatic environment by multiple users, and the interactions between different user groups. This facilitates the optimisation, and a rational exploitation of the resources for different uses.
22. Trend analysis	People's accounts of the past, of how things close to them have changed, ecological histories, changes in land use and cropping patterns, changes in customs and practices, changes and trends in population, migration, fuels used, education, health, credit... and the causes of changes and trends.	As above.

23. Diagrams exhibition	Diagrams, maps, charts, and photos of the research activity are displayed in a public place to share information, facilitate discussions, and provide an additional cross-checking device. The exhibition can inspire more villagers to take part in research activities.	This helps in taking the information generated on fishery resources to a higher level, and acts both as a triangulation (validation) procedure to cross check all significant information, as well as to add more information as it comes from other sources.
24. Time lines	A means of establishing the chronological sequence and relative importance of events is through the creation of a 'time line' with the important events reported by local people being shown in chronological order along a single line. Major historical community events and changes are dated and listed. Understanding the cycles of change can help communities focus on future actions and information requirements.	This explains the changes in the availability of different fishery resources down the years, and the fishers' responses to the changes in the catch composition and quantity. This helps in forecasting the likely changes in the availability and usage of the resource, and the potential implications for fisheries.
25. Seasonal calendars	All the major changes that occur within the rural year are represented including those concerned with climate, cropping patterns, livestock and labour demand, etc. There should be room on the calendar to include the types of problems and constraints and point out opportunities.	Availability and abundance of different fish species in a year can be understood, as also the possible breeding periods for different species of fish. Periods of non-fishing and migration to other areas can be identified.
26. Daily-activity profiles	Researchers can explore and compare the daily-activity patterns of men, women, youth, and elders by charting the amount of time taken to complete tasks. This in turn helps plan the inputs in terms of time and effort that the target individuals can spare for/save through the intended outputs of any research effort. Particularly relevant in gender and poverty analyses.	This helps to establish the pattern of resource utilisation from capture to disposal, and the amount of time it takes to do each task. This might have implications in the post-harvest disposal of the catches, and open up avenues to explore the possible loss reduction methods to reduce wastage.
27. Social and resource mapping	Fishers are asked to draw a simple map or diagram of their area, locality or fishing ground. This type of exercise can generate a lot of local knowledge and information regarding the physical features, infrastructure, geographical distribution of households; names of resource people in the community.	Draws out the indigenous knowledge of the community with regard to fishery resources in the area, and the possible means for maximising its utilisation without overexploiting it.
28. Direct-matrix pair-wise ranking and scoring ***Wealth and well-being rankings***	Used to discover local attitudes on various topics. Wealth ranking can be used to identify wealth criteria and establish the relative position of households. These techniques are useful in discovering, weighting and prioritising problems as presented by groups during the early stages of identifying and setting the research agenda. Wealth ranking is a socio-economic study technique by which researchers, planners and rural development workers can learn the ways in which people's wealth or well-being differs from one another. People are asked to sort cards representing individuals or households from rich to poor or from sick to healthy. This technique can be used for cross-checking information and for initiating discussions on a specific topic.	Ranking and scoring help the researchers in understanding the relative access of fisheries resources to different sections of the society, in terms of technology and reach, depending on their social standing and wealth, and the impact of any measures at conservation on different segments ranging from the poor to the wealthy.
29. Livelihood analysis	This helps understand stability, crises and coping, relative income, expenditure, credit and debt, multiple activities etc.	This shows the extent of dependence of different fishing groups on the resources, and points the need for sustainable options to be in place before fisheries management efforts can take place effectively.

30. Matrices	Matrices can be used to establish relationships between different variables - gender and wellbeing, for instance - and to facilitate or focus analyses and discussions.	Matrices can be used to study relationships, e.g., the impact of increasing or decreasing fishing effort on fishery resources or on different stakeholders depending on fishery resources and so on.
31. Futures possible	People are asked how they would like things to be in 1 year and to predict what will happen if nothing is done or if something is done. People's desires, wishes, and expectations are revealed. Also, it tells the direction that the research should take, and the possible opportunities and constraints.	The fishers' expectation of the research, how they expect responsible management and sustainable livelihoods to go hand in hand etc.
32. Field report writing	Key findings are recorded before 'leaving' the village. Brief summaries are made of each diagram, model, and map, as well as of the process involved in creating them.	This helps the researchers to check all fisheries related information as it arrives and validate it by exchanging it with the fishers on a day-to-day basis. This facilitates making changes to the approaches adopted for the research.
33. Self-correcting field notes	Field notes help the researcher remain focused on what has been done, what was learned through the exercise, and what needs to be done.	This helps the researchers to check all fisheries related information as it arrives and validate it by exchanging it with the fishers on a day-to-day basis. This facilitates making changes to the approaches adopted for the research.
34. Shared presentations and analysis	Participants are encouraged to present their findings to other villagers and to outsiders, providing another opportunity for cross-checking, feedback, comment, and criticism.	The fishers feel encouraged to play a more active role in the research, the information becomes more refined and the processes behind the traditional practices or observed phenomena become more understandable.

The descriptions above were adapted from a variety of sources, these are listed below along with other references for further reading:

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